

10/574297

SEQUENCE LISTING

IAP2004/EP2004/011082 31 MAR 2006

<110> CASTADO, Cindy
DENOEL, Philippe
GODFROID, Fabrice
POOLMAN, Jan

<120> PERTUSSIS ANTIGENS AND USE THEREOF IN
VACCINATION

<130> VB60452

<140> Not Yet Assigned

<141> 2006-03-31

<150> PCT/EP2004/011082

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<151> 2003-10-02

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<213> Bordetella Pertussis

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Pro Asp Ser Asp Thr Tyr Val Ala Thr Gly Thr Thr Ala Gly Thr Lys
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Ala Ala Gln Ile Arg Glu Gln Asn Pro Gln Thr Leu Gly Asp Ala Val
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Arg Tyr Thr Pro Gly Ile Val Val Gln Glu Gly Phe Asn Arg Thr Asp
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Met Phe Arg Asp Gly Leu Lys Ile Pro Leu Pro His Tyr Ser Ala Met
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Ser Glu Pro Tyr Ala Leu Glu Arg Ile Glu Val Val Lys Gly Pro Ala
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Trp															

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<212> PRT

<213> Bordetella Pertussis

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Gly Arg Arg Thr Gln Leu Glu Thr Pro Phe Ser Thr Thr Val Val Thr
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Ala Arg Asp Met Glu Glu Arg Gln Val Asn Lys Leu Gly Asp Val Phe
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 Val Ser Pro Ile Leu Ser Gln Trp Asn Tyr Gly Ser Thr Asp Met Asp

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Tyr	Ser	Asp	Gly	Ser	Arg	Thr	Asp	Phe	Asn	Arg	Ser	Val	Ala	Asn	Asn	
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Lys	Gln	Thr	Gly	Ala	Tyr	Leu	Val	Gly	Arg	Phe	Ala	Leu	Ala	Glu	Pro	
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Asn	Val	Glu	Val	Glu	Gln	Asp	Ser	Tyr	Ala	Leu	Val	Ser	Leu	Met	Ala
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Arg	Phe	Asp	Phe	Asn	Lys	Lys	Leu	Ser	Ala	Thr	Leu	Asn	Val	Asn	Asn
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Leu	Phe	Asp	Lys	Lys	Tyr	Tyr	Asp	Gln	Ile	Gly	Phe	Tyr	Ser	Gln	Gly
		660					665						670		
Trp	Trp	Gly	Ala	Pro	Arg	Asn	Val	Met	Leu	Asn	Leu	Arg	Ala	Gln	Tyr
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<210> 13
 <211> 2232
 <212> DNA
 <213> Bordetella Pertussis

<400> 13

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ctgc	cggtga	cat	tcgac	ac	gggg	cag	tgg	cgcc	atac	ct	gat	ctggg	1140
gcc	accagcc	ggc	gcag	tcg	cgacc	gctac	aag	ca	agaaa	tcccc	gacgc	cgccag	1200
tg	ctgc	ccccg	tgac	ggac	gg		caaca	atccc	gc	cct	gctccg	ggat	1260
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gac	atcctgt	cc	ctgt	acgg	tttc	gacac	acc	atc	gccttcg	acg	agcag	tga	1380
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aag	cacctta	cgg	cccagtt	gaac	gtctac	aac	ctgctcg	aca	agaccta	ttac	gccaag	2160	
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<210> 14
 <211> 743

<212> PRT

<213> Bordetella Pertussis

<400> 14

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Thr	Ala	Val	Gln	Leu	Pro	Ser	Val	Thr	Val	Glu	Gly	Glu	Tyr	Ser	Ser
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Tyr	Gln	Pro	Glu	Ser	Ala	Gln	Ser	Pro	Lys	Phe	Thr	Ala	Pro	Leu	Ala
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65				70						75				80	
Gln	Gly	Ala	Ser	Asp	Leu	Glu	Ala	Val	Leu	Arg	Asn	Ala	Pro	Gly	Ile
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Ser	Met	Thr	Ala	Gly	Glu	Gly	Gly	Arg	Pro	Ala	Ser	Asp	Leu	Pro	Phe
		100					105					110			
Ile	Arg	Gly	Gln	Asn	Ser	Ala	Ser	Ser	Leu	Phe	Val	Asp	Gly	Leu	Arg
	115					120					125				
Asp	Pro	Ser	Thr	Gln	Ser	Arg	Asp	Thr	Phe	Asn	Leu	Glu	Gln	Val	Asp
	130					135					140				
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Gly	Ser	Ile	Asn	Leu	Val	Thr	Lys	Thr	Pro	Arg	Asn	Gln	Asp	Phe	Thr
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Glu	Val	Gln	Ala	Gly	Ile	Gly	Thr	Ala	Glu	Thr	Tyr	Arg	Gly	Thr	Ile
		180					185						190		
Asp	Gly	Asn	Trp	Val	Leu	Gly	Glu	Asn	Thr	Ala	Leu	Arg	Leu	Asn	Leu
	195					200					205				
Leu	Gly	Thr	Arg	Asp	Thr	Val	Pro	Gly	Arg	Asp	Lys	Ala	Val	Glu	Phe
	210				215					220					
Ser	Arg	Val	Gly	Ile	Ala	Pro	Ser	Leu	Arg	Leu	Gly	Leu	Ser	Gly	Pro
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Thr	Arg	Val	Thr	Leu	Gly	Leu	Tyr	His	Tyr	Arg	His	Arg	Arg	Val	Pro
			245					250						255	
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Thr	Ile	Gly	Val	Ser	Arg	Arg	Asn	Phe	Tyr	Gly	Leu	Val	Arg	Arg	Asp
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Ser	Gly	Asp	Thr	Glu	Asp	Tyr	Ala	Ala	Thr	Val	Lys	Trp	Glu	His	Asp
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Leu	Ala	Asn	Gly	Phe	Lys	Val	Glu	Asn	Leu	Ala	Arg	Tyr	Ser	Arg	Ala
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Thr	Val	Glu	Gln	Ile	Thr	Thr	Met	Pro	Glu	Leu	Lys	Thr	Ala	Asp	Leu
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Gln	Trp	Arg	His	Thr	Phe	Asp	Leu	Gly	Gly	Glu	Phe	Ala	Thr	Ser	Arg
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Arg	Asp	Pro	Asp	Pro	His	Val	Asp	Phe	Pro	Gly	Thr	Val	Arg	Arg	Asn
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His	Asn	Pro	Ala	Arg	Tyr	His	Thr	Asp	Ile	Leu	Ser	Leu	Tyr	Gly	Phe
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Trp Asp His Tyr Lys Thr Ser Gly Arg Asn Leu Pro Val Arg Gly Ala		
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Lys Pro Pro Val Tyr Glu Arg Ala Ala Arg Thr Asp Asn Leu Phe Asn		480
	485	490
Tyr Gln Leu Gly Leu Val Tyr Lys Pro Arg Pro Asp Gly Ser Val Tyr		495
	500	505
Ala Ser Tyr Gly Thr Ala Ser Thr Pro Ser Ala Val Ser Asp Tyr Ala		510
	515	520
Pro Ala Asp Ser Ile Ser Gly Thr Ser Gln Gln Leu Lys Pro Glu Arg		525
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Ser Glu Ala Ile Glu Ile Gly Thr Lys Trp Gln Val Leu Asp Arg Arg		540
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Leu Leu Val Thr Gly Ala Met Phe Arg Glu Thr Arg Lys Asn Thr Ser		560
	565	570
Ile Glu Val Ala Glu Gly Leu Arg Ala Pro Ala Gly Lys Ser Arg Val		575
	580	585
Thr Gly Met Glu Leu Gly Val Ala Gly Ser Leu Thr Pro Arg Trp Asp		590
	595	600
Val Tyr Gly Gly Tyr Ala Leu Asp Ser Lys Leu Val Arg Ala Ser		605
	610	615
His Lys Ser Gly Ala Gln Gly Gln Pro Leu Pro Ser Ala Pro Arg His		620
625	630	635
Ala Phe Ser Ile Trp Ser Thr Tyr Lys Leu Leu Pro Glu Leu Thr Val		640
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Gly Ala Gly Ala Phe Tyr Arg Ser Lys Val Tyr Gly Asn Ala Asp Ala		655
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Gly Tyr Asn Lys Asp Gly Thr Pro Lys Ala Arg Trp Val Pro Ala Tyr		670
	675	680
Trp Arg Phe Asp Ala Met Ala Ala Tyr Gln Leu Asn Lys His Leu Thr		685
690	695	700
Ala Gln Leu Asn Val Tyr Asn Leu Leu Asp Lys Thr Tyr Tyr Ala Lys		705
705	710	715
Thr Tyr Arg Ser His Tyr Ala Ala Leu Gly Pro Gly Arg Ser Ala Met		720
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<210> 15

<211> 2271

<212> DNA

<213> Bordetella Pertussis

<400> 15

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<210> 16

<211> 756

<212> PRT

<213> Bordetella Pertussis

<400> 16

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Pro Gly Ala Gln Ala Gln Thr Ser Ala Gly Val Thr Gln Leu Ala Pro
35          40          45
Val Gln Val Glu Gly Glu Ala Ser Pro Tyr Gln Ala Thr Thr Val Gln
50          55          60
Ser Ser Lys Met Thr Ala Pro Leu Leu Asp Thr Pro Arg Thr Val Gln
65          70          75          80
Val Val Pro Gln Gln Val Ile Gln Asp Gln Ala Ala Thr Asn Leu Gln
85          90          95
Asp Val Leu Arg Asn Ser Pro Gly Ile Thr Met Gly Ala Gly Glu Gly
100          105          110
Gly Arg Ala Gly Gly Asp Leu Pro Ile Ile Arg Gly Gln Asn Ala Ala
115          120          125
Gly Ser Ile Phe Val Asp Gly Val Arg Asp Pro Ser Thr Gln Ile Arg
130          135          140
Asp Thr Phe Asn Leu Glu Gln Val Glu Ile Ile Lys Gly Pro Asp Ser
145          150          155          160
Val Tyr Ser Gly Arg Gly Gly Ala Gly Gly Ser Ile Asn Leu Val Ser
165          170          175
Lys Thr Pro Lys Ala Arg Asp Phe Ala Glu Gly Ser Val Gln Ile Gly
180          185          190
Thr Asp Ser Asn Tyr Arg Ala Thr Ala Asp Gly Asn Trp Leu Leu Gly
195          200          205
Asp Asn Ala Ala Phe Arg Leu Asn Leu Met Gly Asn Lys Gly Asp Val
210          215          220
Pro Gly Arg Asp His Ala Val Asp Phe Ser Arg Trp Gly Val Ala Pro
225          230          235          240
Thr Leu Gln Leu Gly Val Gly Thr Pro Thr Arg Ile Thr Leu Gly Tyr
245          250          255

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	290					295					300				
Val	Ala	Thr	Leu	Ala	Ile	Asp	His	Asp	Phe	Ser	Ser	Lys	Leu	Arg	Leu
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Arg	Asn	Val	Thr	Arg	Tyr	Gly	Arg	Ser	Val	Thr	Asp	Tyr	Ala	Ala	Thr
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Ala	Leu	Lys	Ala	Gly	Tyr	Tyr	Thr	Asn	Lys	Thr	Phe	Thr	Asn	Gln	Thr
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Val	Gly	Phe	Glu	Tyr	Ser	Asn	Ile	Lys	Gln	Asp	Lys	Asp	Ser	Tyr	Thr
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Gln	Thr	Ile	Ala	Lys	Gly	Ala	Met	Pro	Cys	Lys	Val	Gly	Ala	Asn	Asp
				405					410					415	
Ala	Ser	Asn	Pro	Ala	Leu	Cys	Thr	Ser	Leu	Trp	Asp	Pro	Asp	Pro	His
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Asp	Tyr	Tyr	Pro	Gly	His	Leu	Ser	Arg	Asn	Asp	Asn	Pro	Ala	Arg	Tyr
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Ser	Thr	Asp	Thr	Ile	Ala	Leu	Tyr	Gly	Phe	Asp	Thr	Ile	Lys	Phe	Asn
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Glu	Gln	Trp	Gln	Ala	Ser	Val	Gly	Leu	Arg	Trp	Asp	Asn	Tyr	Arg	Val
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Ser	Gly	Ser	Asn	Ile	Ala	Arg	Gly	Arg	Asn	Asp	Pro	Ala	Ser	Thr	Pro
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Ala	Phe	Tyr	Ser	Thr	Ser	Arg	Glu	Asp	Asn	Leu	Phe	Asn	Tyr	Gln	Leu
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Gly	Leu	Ala	Tyr	Lys	Pro	Val	Pro	Asn	Gly	Thr	Ile	Tyr	Ala	Ser	Tyr
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Asp	Ala	Met	Ala	Ala	Tyr	Glu	Phe	Asn	Asp	His	Leu	Thr	Ala	Gln	Leu
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Asn	Val	Met	Asn	Ile	Phe	Asp	Lys	Thr	Tyr	Tyr	Thr	Lys	Ala	Tyr	Ala
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Tyr	Gly	Val	Asp	Asn	Arg	Gly	Asp	Tyr	Val	Arg	Val	Arg	Gly	Val	Glu
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Pro	Ala	Ser	Met	Leu	Tyr	Gly	Gln	Gly	Ser	Thr	Gly	Gly	Val	Val	Asn
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Phe Ser Leu Trp Ser Lys Tyr Arg Phe Ser Val Gly Asp Val His Gly				
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<211> 870

<212> PRT

<213> Bordetella pertussis

<400> 20

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35          40          45
Thr Ala Ala Pro Ala Ser Ala Gly Ala Arg Ala Trp His Ile Asp Ala
50          55          60
Gly Pro Leu Gly Glu Ala Leu Ala Arg Phe Ala Asp Gln Ala Gly Ile
65          70          75          80
Thr Leu Leu Tyr Asp Pro Ala Ala Val Arg Gly Arg Ala Ser Ala Gly
85          90          95
Leu Gln Gly Val Tyr Ser Val Pro Asp Gly Leu Ala Arg Leu Leu Asp
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Gln Ala Leu Pro Ala Gly Pro Val Ala Gln Leu Ala Pro Val Thr Ile
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Glu Ala Asp Gly Val Arg Ala Asp Pro Ala Trp Ala Arg Thr Ala Thr
145         150         155         160
Arg Arg Glu Leu Asp Ala Arg Gln Val Leu Asp Trp Ser Asp Ile Gly
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Lys Arg Val Asp Pro Gly Val Asn Tyr Asn Arg Arg Thr Lys Ser Ile
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Ile Arg Leu Pro Trp Leu Asp Gly Ala Arg Gly Ile Gln Gly Gly
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Ser	Pro	Gln	Trp	Gln	Pro	Ala	Trp	Asp	Gly	Gln	Tyr	Pro	Leu	Gly	Val	690	695	700
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Val	Pro	Pro	Leu	Lys	Ala	Ile	Leu	Gly	Leu	Gly	Tyr	Gln	Arg	Asp	Glu	755	760	765
Trp	Gly	Ile	Asp	Ala	Met	Leu	Thr	Ala	Ala	Thr	Arg	Arg	Asp	Asp	Val	770	775	780
Gln	Tyr	Pro	Glu	Ala	Ser	Ala	Ser	Ala	Arg	Tyr	Ala	Asp	Phe	Gln	Ala	785	790	795
Pro	Gly	Tyr	Gly	Val	Val	Asp	Leu	Ser	Ala	Tyr	Trp	Arg	Pro	Ala	Ala	805	810	815
Val	Lys	Gly	Leu	Gln	Leu	Gln	Ala	Gly	Val	Phe	Asn	Leu	Phe	Asp	Lys			

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<400> 21

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<210> 22
 <211> 760
 <212> PRT
 <213> Bordetella pertussis

<400> 22

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Arg	Ile	Asp	Ala	Asn	Ala	Asn	Ala	Ser	Asp	Gly	Trp	Val	Asp	Gly	Asn
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Arg	Ser	His	Ala	Glu	Gln	Val	Ala	Ala	Ser	Leu	Leu	Ser	Asp	Leu	Gly
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Ser	Val	Thr	Ala	Arg	Val	Arg	Asn	Leu	Thr	Asp	Lys	Val	Tyr	Ala	Ala
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Ser	Val	Thr	Gly	Ala	Pro	Met	Tyr	Tyr	Leu	Gly	Ala	Pro	Arg	Ser	Val
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<210> 23

<211> 1890

<212> DNA

<213> Bordetella pertussis

<400> 23

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<210> 24

<211> 629

<212> PRT

<213> Bordetella pertussis

<400> 24

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Ile Pro Glu Leu Asp Pro Val Val Thr Ala Ala Arg Ser Pro Gln
 35          40          45
Leu Leu Lys Asn Val Leu Ala Asp Ala Ser Val Ile Glu Arg Asp Thr
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Leu Ala Arg Ala Gly Gln Ser Ser Leu Ala Glu Val Leu Ala Gln Gln
 65          70          75          80
His Gly Ile Glu Phe Ala Asp Ser Gly Gly Pro Gln Ser Val Thr Ser
 85          90          95
Leu Phe Met Arg Gly Ala Asn Ser Asn Gln Thr Leu Val Leu Leu Asn
100          105          110
Gly Gln Arg Ile Asn Asn Ala Asn Gly Gly Gly Ile Ala Leu Asn Ala
115          120          125
Leu Pro Pro Glu Ala Ile Glu Arg Ile Glu Ile Met Arg Gly Ala Ala
130          135          140
Ser Ser Leu Tyr Gly Ala Asp Ala Ile Gly Gly Val Ile Asn Ile Ile
145          150          155          160
Thr Arg Glu Pro Gly Asp Lys Ala Leu Ser Ala Tyr Ala Asn Ala Gly
165          170          175
Tyr Gly Thr Tyr Gly Thr Ser Arg Tyr Asp Ala Gly Val Ser Gly Ala
180          185          190
Ala Asp Gly Phe Ser Tyr Ser Leu Ser Thr Gly Tyr Gly Gln Ser His
195          200          205
Gly Phe Asn Ala Thr Asn Arg Arg Ser Phe Ser Tyr Asn Pro Asp Lys
210          215          220
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225          230          235          240
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245          250          255
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260          265          270
Gln Asp Leu Gln Ala Tyr Ser Leu Ala Ser Glu Asn Arg Leu Thr Arg
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Asp	Glu	Asp	Ser	Glu	Leu	Gly	Val	Val	Tyr	Tyr	Gln	Thr	Arg	Ile Lys
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	515					520						525		
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Ala	Ser	Asp	Glu	Arg	Tyr	Asp	Tyr	Gly	Phe	Pro	Glu	Glu	Lys	Arg Leu
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Gly	Gly	Tyr	Gly	Leu	Val	Asn	Leu	Thr	Ala	Ala	Tyr	Asp	Leu	Ser Arg
		580				585						590		
Asn	Met	Gln	Val	Gln	Val	Arg	Trp	Asn	Asn	Val	Leu	Gly	Gln	Arg Tyr
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Thr	Leu	Ala	Asp	Gly	Tyr	Asn	Thr	Ala	Gly	Ser	Asn	Ala	Phe	Val Asn
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<210> 25

<211> 1734

<212> DNA

<213> Bordetella pertussis

<400> 25

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<210> 26

<211> 577

<212> PRT

<213> Bordetella pertussis

<400> 26

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Ala Leu Ala Gly Ala Phe Pro Ala Pro Ser Gly Ala Ala Pro Ala Glu
          20          25          30
Leu Ala Pro Ile Ala Val Ile Gly Asp Asp Pro Asp Asp Pro Arg Val
          35          40          45
Phe Glu Gly Ser Thr Ala Thr Arg Thr Ala Thr Pro Leu Arg Glu Val
          50          55          60
Pro Gln Thr Val Asp Thr Val Lys Val Pro Asp Ala Leu Asn Tyr Gly
65          70          75          80
Ala Arg Thr Leu Gly Glu Ala Leu Ala Gly Val Pro Asn Val Thr Asp
          85          90          95
Ala Ser Asp Thr Arg Phe Asp Gly Leu Arg Ile Arg Gly Phe Asp Ala
          100          105          110
Gly Ser Asp Phe Tyr Leu Asp Gly Val Arg Asp Asp Ser Gln Tyr Val
          115          120          125
Arg Asp Leu His Asn Ile Glu Arg Ile Glu Val Leu Lys Gly Pro Ala
          130          135          140
Gly Val Leu Tyr Gly Arg Gly Ser Gln Gly Gly Ile Val Asn Arg Val
145          150          155          160
Ser Lys Ala Pro Gly Pro Gly Arg Ala Ser Thr Leu Glu Val Arg Leu
          165          170          175
Gly Gly Glu Asp Phe Arg Ser Leu Tyr Ala Asp Leu Ser Ala Asp Pro
          180          185          190
Ser Asp Thr Val Ser Leu Arg Leu Asn Val Gly Gly Glu Asn Ala Gly
          195          200          205
Ser Phe Arg His Gly Val Ser Ser Arg Arg Arg Leu Ala Ser Pro Ala
          210          215          220
Leu Ala Trp Arg Ile Thr Pro Arg Leu Asp Trp Leu Ala Gln Tyr Glu
225          230          235          240
His Ser Arg Tyr Asp Arg Val Pro Asp Arg Gly Ile Pro Ser Val Asp
          245          250          255
Gly Arg Pro Ala Pro Val Gly Arg Ser Thr Val Tyr Gly Asp Pro Gly
          260          265          270
Arg Asp Asn Ile Asp Asp Arg Val Gln Val Leu Arg Ser Arg Leu Arg
          275          280          285
Tyr Arg Ala Ala Asn Gly Trp Glu Leu Arg His Thr Leu Ser Thr Phe

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290	295	300
Arg Leu His Ser Asp Phe Asp Asn Thr Tyr Leu Ser Gly Trp Arg Ala		
305	310	315
Glu Thr Gly Leu Val Gln Arg Gln Arg Trp Gln Gln His Leu Arg Ala		320
	325	330
Arg His Leu Tyr Asn Val Phe Glu Ala Glu Gly Thr Phe Ala Thr Gly		335
	340	345
Trp Leu Glu His Arg Leu Leu Ala Gly Val Glu Leu Gly Ser Gln His		350
	355	360
Arg Asp Pro Thr Leu His Arg Ala Ala Thr Lys Gly Pro Gly Ala Gln		365
	370	375
Pro Val Pro Gly Leu Ala Leu His His Pro Asp Leu Ser Gln Gln His		380
385	390	395
His Gly Arg Met Glu Arg Ala Ser Asp Ala Arg His Arg Val Arg Thr		400
	405	410
Gln Gly Tyr Tyr Leu Gln Asp Gln Leu Arg Leu Ser Glu Ser Trp Gln		415
	420	425
Val Val Ala Gly Ala Arg Leu Asp Arg Phe Gly Val Arg Thr Arg Asn		430
	435	440
Arg Leu Leu Gly Leu Glu Gly Ser Arg Gly Asp Arg Ser Val Ser Pro		445
	450	455
Arg Leu Gly Val Val Trp Thr Pro Trp Pro Ala His Ala Phe Tyr Ala		460
465	470	475
Ser Tyr Ser Lys Thr Phe Ser Pro Thr Gly Gly Gly Thr Ile Gly Ile		480
	485	490
Thr Pro Asp Ala Arg Gly Asn Ala Asn Asp Leu Pro Pro Glu His Thr		495
	500	505
Arg Gln Tyr Glu Ala Gly Val Lys Ser Asp Trp Leu Asp Gly Arg Leu		510
	515	520
Ser Thr Met Leu Ala Val Tyr Gln Leu Glu Leu Tyr Asn Arg Arg Thr		525
	530	535
Arg Ala Pro His Asp Pro Thr Arg Ile Leu Leu Thr Gly Leu Gln Arg		540
545	550	555
Ser Arg Gly Leu Glu Met Ser Gly Ala Gly Arg Leu Ala Val Lys Ile		560
	565	570
		575
Gln		

<210> 27
 <211> 1437
 <212> DNA
 <213> Bordetella pertussis

<400> 27
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 acctcgggtgc tcgatacgcc cgcgctccgtg gacgtggctc atggccacga gctgcgcgcg 180
 cgcaacctgc aggtcaacct gtccgaaggc ttggccggcg tgcccggact gcagctgcag 240
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 ggcccgttct cggccctgta cggcaattcg tcgggcggcg tgggtgcagg gttcaccgaa 480
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 ggacaacgcc gcaccacga ataccaatcc atcccgtgg ccgtgcagca aagccccacg 960

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cggacgcgcc acctatcgca aggccttgcc ggtggcgggc ctgcgctatg cggccaacga 1380
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<210> 28

<211> 478

<212> PRT

<213> Bordetella pertussis

<400> 28

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Gly Gly Pro Ala Ala Ala Gln Glu Ala Pro Ala Met Leu Glu Pro Val
 20          25          30
Arg Ile Ser Gly Thr Arg Thr Gly Thr Ser Val Leu Asp Thr Pro Ala
 35          40          45

Ser Val Asp Val Val Asp Gly His Glu Leu Arg Ala Arg Asn Leu Gln
 50          55          60
Val Asn Leu Ser Glu Gly Leu Ala Gly Val Pro Gly Leu Gln Leu Gln
 65          70          75          80
Asn Arg Gln Asn Tyr Ala Gln Asp Leu Gln Leu Ser Ile Arg Gly Phe
 85          90          95
Gly Ala Arg Ser Thr Phe Gly Val Arg Gly Val Arg Leu Tyr Val Asp
100          105          110
Gly Ile Pro Ala Thr Met Pro Asp Gly Gln Gly Gln Thr Ser Asn Ile
115          120          125
Asp Ile Gly Ser Ala Gly Arg Val Glu Val Leu Arg Gly Pro Phe Ser
130          135          140
Ala Leu Tyr Gly Asn Ser Ser Gly Gly Val Val Gln Val Phe Thr Glu
145          150          155          160
Gln Gly Ser Asp Pro Pro Glu Ala Thr Gly Ser Ala Ala Ala Gly Ser
165          170          175
Phe Gly Thr Trp Arg Tyr Gly Ala Lys Leu Arg Gly Ala Ser Ala Ala
180          185          190
Asp Gly Leu Asp Tyr Val Leu Asp Phe Asn Arg Phe Thr Thr Glu Gly
195          200          205
Tyr Arg Asp His Ser Ala Ala Arg Lys Asn Leu Gly Asn Ala Arg Leu
210          215          220
Gly Leu Arg Met Asp Asp Gly Ser Arg Leu Thr Leu Ser Ala Asn His
225          230          235          240
Val Asp Leu Thr Ala Gln Asp Pro Leu Gly Leu Thr Arg Glu Gln Phe
245          250          255
Glu Asp Asp Pro Arg Ser Ala Pro Val Ala Glu Arg Phe Asp Thr Arg
260          265          270
Lys Thr Val Arg Gln Thr Gln Gly Gly Leu Leu Tyr Glu Arg Ala Phe
275          280          285
Asp Thr Arg Asn Asp Leu Arg Val Met Leu Tyr Tyr Gly Gln Arg Arg
290          295          300
Thr Thr Gln Tyr Gln Ser Ile Pro Val Ala Val Gln Gln Ser Pro Thr
305          310          315          320
Gln Ala Gly Gly Val Ile Asp Leu Gly Arg Asp Tyr Gly Gly Ala Asp
325          330          335
Leu Arg Trp Thr Ser Arg Gln Gln Val Ala Gly Leu Pro Leu Thr Leu
340          345          350
Ile Gly Gly Leu Ala Tyr Asp Thr Met Lys Glu Gln Arg Arg Gly Tyr

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355	360	365
Asp Asn Tyr Thr Gly Pro Pro Ala Ala Pro Thr Gly His Gly Arg Gln		
370	375	380
Gly Arg Val Ala Ala Arg Arg Asp Gln His Gly Leu Gln Pro Gly Pro		
385	390	395
Val Pro Ala Gly Leu Val Ala Val Arg Arg Ala Leu Asp Ala Gly Arg		
405	410	415
Gly Ala Ala Leu Gln His Gly Ala Leu Arg Leu Gly Arg Ser Leu Pro		
420	425	430
Gly Ala Gly Gln Arg Arg Arg Gln Arg Thr Arg His Leu Ser Gln Gly		
435	440	445
Leu Ala Gly Gly Gly Ala Ala Leu Cys Gly Gln Arg Glu Pro Glu Pro		
450	455	460
Val Arg Leu Val Arg Thr Arg Leu Arg Asp Ala His Ala Gln		
465	470	475

<210> 29

<211> 2733

<212> DNA

<213> Bordetella pertussis

<400> 29

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atcgtcaaga ccggtgagcg ccagcatggc atccatatcc agggctccga cccgggcggc 180
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ggcgaccgcg gcttcaccgg cgacggcggc ggccacaccg acagcgtgca tgtcgggggc 2160
tatgccacat atatcgccga cagcggtttc tacctggacg cgacgctgcg cgccagccgc 2220

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ctggagaatg acttcaaggt ggcggggcagc gacgggtacg cgggtcaaggg caagtaccgc 2280
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ttcctcgagc cgcaggccga gctggcggtg ttccggggcg gcggcggtgc gtaccgcgcg 2400
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gaggtcggca agcgcacgca actggcaggc ggcaggcagg tgcagccata catcaaggcc 2520
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<210> 30

<211> 910

<212> PRT

<213> Bordetella pertussis

<400> 30

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Met Asn Met Ser Leu Ser Arg Ile Val Lys Ala Ala Pro Leu Arg Arg
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Thr Thr Leu Ala Met Ala Leu Gly Ala Leu Gly Ala Ala Pro Ala Ala
20      25      30
His Ala Asp Trp Asn Asn Gln Ser Ile Val Lys Thr Gly Glu Arg Gln
35      40      45
His Gly Ile His Ile Gln Gly Ser Asp Pro Gly Gly Val Arg Thr Ala
50      55      60
Ser Gly Thr Thr Ile Lys Val Ser Gly Arg Gln Ala Gln Gly Ile Leu
65      70      75      80
Leu Glu Asn Pro Ala Ala Glu Leu Gln Phe Arg Asn Gly Ser Val Thr
85      90      95
Ser Ser Gly Gln Leu Ser Asp Asp Gly Ile Arg Arg Phe Leu Gly Thr
100     105     110
Val Thr Val Lys Ala Gly Lys Leu Val Ala Asp His Ala Thr Leu Ala
115     120     125
Asn Val Gly Asp Thr Trp Asp Asp Asp Gly Ile Ala Leu Tyr Val Ala
130     135     140
Gly Glu Gln Ala Gln Ala Ser Ile Ala Asp Ser Thr Leu Gln Gly Ala
145     150     155     160
Gly Gly Val Gln Ile Glu Arg Gly Ala Asn Val Thr Val Gln Arg Ser
165     170     175
Ala Ile Val Asp Gly Gly Leu His Ile Gly Ala Leu Gln Ser Leu Gln
180     185     190
Pro Glu Asp Leu Pro Pro Ser Arg Val Val Leu Arg Asp Thr Asn Val
195     200     205
Thr Ala Val Pro Ala Ser Gly Ala Pro Ala Ala Val Ser Val Leu Gly
210     215     220
Ala Ser Glu Leu Thr Leu Asp Gly Gly His Ile Thr Gly Gly Arg Ala
225     230     235     240
Ala Gly Val Ala Ala Met Gln Gly Ala Val Val His Leu Gln Arg Ala
245     250     255
Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val Pro Gly Gly
260     265     270
Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe
275     280     285
Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser Gly Ser Ser
290     295     300
Val Glu Leu Ala Gln Ser Ile Val Glu Ala Pro Glu Leu Gly Ala Ala
305     310     315     320
Ile Arg Val Gly Arg Gly Ala Arg Val Thr Val Ser Gly Gly Ser Leu
325     330     335
Ser Ala Pro His Gly Asn Val Ile Glu Thr Gly Gly Ala Arg Arg Phe
340     345     350
Ala Pro Gln Ala Ala Pro Leu Ser Ile Thr Leu Gln Ala Gly Ala His

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		355					360					365			
Ala	Gln	Gly	Lys	Ala	Leu	Leu	Tyr	Arg	Val	Leu	Pro	Glu	Pro	Val	Lys
	370					375					380				
Leu	Thr	Leu	Thr	Gly	Gly	Ala	Asp	Ala	Gln	Gly	Asp	Ile	Val	Ala	Thr
385				390						395					400
Glu	Leu	Pro	Ser	Ile	Pro	Gly	Thr	Ser	Ile	Gly	Pro	Leu	Asp	Val	Ala
				405					410					415	
Leu	Ala	Ser	Gln	Ala	Arg	Trp	Thr	Gly	Ala	Thr	Arg	Ala	Val	Asp	Ser
			420					425					430		
Leu	Ser	Ile	Asp	Asn	Ala	Thr	Trp	Val	Met	Thr	Asp	Asn	Ser	Asn	Val
		435					440					445			
Gly	Ala	Leu	Arg	Leu	Ala	Ser	Asp	Gly	Ser	Val	Asp	Phe	Gln	Gln	Pro
	450					455					460				
Ala	Glu	Ala	Gly	Arg	Phe	Lys	Val	Leu	Thr	Val	Asn	Thr	Leu	Ala	Gly
465					470					475					480
Ser	Gly	Leu	Phe	Arg	Met	Asn	Val	Phe	Ala	Asp	Leu	Gly	Leu	Ser	Asp
				485					490					495	
Lys	Leu	Val	Val	Met	Gln	Asp	Ala	Ser	Gly	Gln	His	Arg	Leu	Trp	Val
			500					505					510		
Arg	Asn	Ser	Gly	Ser	Glu	Pro	Ala	Ser	Ala	Asn	Thr	Leu	Leu	Leu	Val
		515					520					525			
Gln	Thr	Pro	Leu	Gly	Ser	Ala	Ala	Thr	Phe	Thr	Leu	Ala	Asn	Lys	Asp
	530					535					540				
Gly	Lys	Val	Asp	Ile	Gly	Thr	Tyr	Arg	Tyr	Arg	Leu	Ala	Ala	Asn	Gly
545					550					555					560
Asn	Gly	Gln	Trp	Ser	Leu	Val	Gly	Ala	Lys	Ala	Pro	Pro	Ala	Pro	Lys
				565					570					575	
Pro	Ala	Pro	Gln	Pro	Gly	Pro	Gln	Pro	Pro	Gln	Pro	Pro	Gln	Pro	Gln
			580					585					590		
Pro	Glu	Ala	Pro	Ala	Pro	Gln	Pro	Pro	Ala	Gly	Arg	Glu	Leu	Ser	Ala
		595					600					605			
Ala	Ala	Asn	Ala	Ala	Val	Asn	Thr	Gly	Gly	Val	Gly	Leu	Ala	Ser	Thr
	610					615					620				
Leu	Trp	Tyr	Ala	Glu	Ser	Asn	Ala	Leu	Ser	Lys	Arg	Leu	Gly	Glu	Leu
625					630					635					640
Arg	Leu	Asn	Pro	Asp	Ala	Gly	Gly	Ala	Trp	Gly	Arg	Gly	Phe	Ala	Gln
				645					650					655	
Arg	Gln	Gln	Leu	Asp	Asn	Arg	Ala	Gly	Arg	Arg	Phe	Asp	Gln	Lys	Val
			660					665					670		
Ala	Gly	Phe	Glu	Leu	Gly	Ala	Asp	His	Ala	Val	Ala	Val	Ala	Gly	Gly
		675					680					685			
Arg	Trp	His	Leu	Gly	Gly	Leu	Ala	Gly	Tyr	Thr	Arg	Gly	Asp	Arg	Gly
	690					695						700			
Phe	Thr	Gly	Asp	Gly	Gly	Gly	His	Thr	Asp	Ser	Val	His	Val	Gly	Gly
705															

Ala	Gly	Thr	Val	His	Thr	Asn	Gly	Ile	Ala	His	Arg	Thr	Glu	Leu	Arg
850						855					860				
Gly	Thr	Arg	Ala	Glu	Leu	Gly	Leu	Gly	Met	Ala	Ala	Ala	Leu	Gly	Arg
865					870					875					880
Gly	His	Ser	Leu	Tyr	Ala	Ser	Tyr	Glu	Tyr	Ser	Lys	Gly	Pro	Lys	Leu
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Ala	Met	Pro	Trp	Thr	Phe	His	Ala	Gly	Tyr	Arg	Tyr	Ser	Trp		
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<210> 31

<211> 2748

<212> DNA

<213> Bordetella pertussis

<400> 31

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<212> PRT

<213> Bordetella pertussis

<400> 32

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<212> DNA

<213> Bordetella pertussis

<400> 33

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<212> PRT

<213> Bordetella pertussis

<400> 34

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 <212> PRT
 <213> Bordetella pertussis

<400> 36

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 <212> DNA
 <213> Bordetella pertussis

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 <213> Bordetella pertussis

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Thr	Gln	Gly	Leu	Ala	Ala	Leu	Thr	Pro	Ala	Gln	Arg	Ala	Arg	Leu
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<210> 39

<211> 2712

<212> DNA

<213> Bordetella pertussis

<400> 39

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<211> 903

<212> PRT

<213> Bordetella pertussis

<400> 40

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Trp Val Val Gly Gly Glu Leu Ile Val Gly Asp Thr Gly Ala Gly Thr
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Ser	Thr	Gln	Arg	Gly 515	Ile	Gln	Val	Val	Gln	Val	Asn	Gly	Ala	Ser	Ala 525
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Ala	Leu	Val	Ala	Gly	Ala	Tyr	Gly	Tyr	Val	Leu	Gln	Gln	Asp	Ala	Ala

545	Asp	Gly	Asp	Trp	Tyr	Leu	Lys	Ser	Ser	Leu	Pro	Asp	Pro	Gly	Ala	Pro
					565					570					575	
Gln	Gly	Gly	Gly	Gly	Leu	Pro	Gly	Ala	Gly	Glu	Pro	Val	Leu	Tyr	Gln	
				580				585					590			
Pro	Gly	Val	Pro	Val	Tyr	Glu	Ala	Tyr	Ala	Asn	Thr	Leu	Leu	His	Leu	
		595					600				605					
Ser	Arg	Leu	Ser	Thr	Leu	Arg	Gln	Arg	Val	Gly	Asn	Arg	Leu	Tyr	Asp	
	610					615					620					
Pro	Ala	Asp	Val	Gly	Arg	Asn	Gly	Val	Trp	Ser	Arg	Val	Glu	Gly	Ser	
625					630					635					640	
Ala	Ser	Gln	Leu	Asp	Pro	Ser	Ala	Ser	Thr	Thr	Gly	Glu	Arg	Gln	Asp	
				645		/			650					655		
Val	Asp	Ser	Trp	Lys	Val	Gln	Phe	Gly	Val	Asp	Arg	Ile	Leu	Ala	Gly	
			660					665					670			
Gly	Gln	Glu	Gly	Ser	Arg	Leu	Val	Gly	Gly	Leu	Ala	Leu	Gln	Tyr	Gly	
		675					680					685				
Lys	Ala	Asp	Thr	Arg	Val	Ser	Ile	Tyr	Gly	Asn	Gly	Thr	Val	Asp		
	690					695				700						
Ala	Thr	Ala	Tyr	Gly	Leu	Thr	Pro	Thr	Leu	Thr	Trp	Tyr	Gly	Arg	Asp	
705					710					715					720	
Gly	Ala	Tyr	Val	Asp	Ala	Gln	Ala	Gln	Ala	Ile	Trp	Phe	Asp	Ser	Asp	
				725					730					735		
Leu	Ser	Ser	Arg	Leu	Ala	Gly	Lys	Leu	Lys	Asp	Gly	Arg	Lys	Ala	His	
			740					745					750			
Gly	Tyr	Gly	Leu	Gly	Ile	Glu	Ala	Gly	Lys	Ala	Phe	Gly	Leu	Arg	Glu	
		755					760					765				
Gly	Leu	Ala	Leu	Ile	Pro	Gln	Ala	Gln	Leu	Ser	Tyr	Ala	Ser	Thr	Arg	
	770					775					780					
Phe	Asp	Ser	Phe	Asp	Asp	Arg	Phe	Gly	Ala	Arg	Val	Glu	Asp	Asp	Lys	
785					790					795					800	
Gly	Asp	Ser	Leu	Gln	Gly	Arg	Leu	Gly	Ile	Ala	Leu	Asp	Tyr	Lys	Ser	
				805					810					815		
Ser	Trp	Gln	Ala	Gly	Gly	Ala	Asn	Arg	Glu	Ser	Ser	Val	Phe	Gly	Ile	
			820					825					830			
Val	Asn	Val	Lys	His	Glu	Phe	Leu	Asp	Gly	Thr	Arg	Val	Arg	Val	Ala	
	835						840					845				
Gly	Val	Pro	Val	Ser	Ser	Arg	Met	Ala	Arg	Thr	Trp	Gly	Ser	Val	Gly	
	850					855					860					
Val	Gly	Ala	Asp	Tyr	Gly	Trp	Gly	Glu	Arg	Tyr	Ala	Ile	Tyr	Gly	Gln	
865					870					875					880	
Val	Asp	Ala	Asp	Ala	Asp	Phe	Ala	Gly	Ser	Tyr	Ile	Val	Thr	Ala	Thr	
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Ala	Gly	Phe	Arg	Met	Met	Phe										
				900												

<210> 41

<211> 1449

<212> DNA

<213> Bordetella pertussis

<400> 41

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ccctccgagc	ctggcaaggc	ggccgaaaaa	atcggggtaa	tgccgaacga	ggacctcggc	180
aagtggctgg	ttccgggggc	gcaaaagaac	aatccgccc	agcctggcaa	gacgctggac	240
gaaatccgtg	cgggtctcga	aaaatgggtg	gcgcccgggt	ccaagccgcc	cgtcgaaccg	300
gatccggaca	aggcgacgca	ggcgtatcgc	aaagacctcg	ataaatggct	ggcgccctccg	360
gccaagtccg	gcccgccga	agcgccaccc	gtcgtccaac	ccgaagcgcc	ggcgcaagcg	420

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caacctgagg cgccgcctgt cgtgccgccg cgggccgagc cgccagcagc tcgaccgccg 480
gccgttccgc ccgcgcggcc ggccggcgac gcggtgtacg tgccggggcac gcgcacgctg 540
acgccgacgg ccaacgcggc ggtggggcac gccagcgccg cgcaaggtct gtggcaggcc 600
gagatgaacg cgttgagcaa gcgcattggc gagttgcgcc tgacgccggt tgcggggcggc 660
gtatggggcc gcgctttttg ccggcgccag gacgtcgaca accgcgtgtc gcgcgagttc 720
cgccagacca tcagcggttt cgaactgggc gccgataccg ccttgccggt ggccgacggg 780
cgctggcacg tgggcgcggt ggctggctac accaacggcc gcatcaagtt cgaccggggc 840
ggcacggggc atgacgacag cgtgcacgtg ggcgcttacg ctacctacat cgaggacggc 900
ggttttctata tggatggcat cgtgcgggtc agccgcattc gccacgcggt caaggtggac 960
gacgccaaagg gccggcgcgct gcgcggccag taccgcggca atggcggtgg gcgctcgctg 1020
gaactgggca agcgcttcac gtggccccgc gcctggtacg tggagccgca gctggagggtg 1080
gccgccttcc atgcgcaagg ggccgactac accgccagca acggcctgcg catcaaggac 1140
gacggcacga actccatgct ggccgcctg ggctgcacg tggggcgggc gttcgacctg 1200
ggcgatggcc gcgtggtgca gccctacatg aagctgagct ggggtgcagga gttcgacggc 1260
aagggcacgg tgcgcaccaa cgacatccgg cacaaggtgc ggctcgatgg cggccgcacc 1320
gaactggccg taggggtggc ttcgcaactg ggcaagcacg gcagcctgtt cggctcgtac 1380
gagtacgcca agggcagccg ccagaccatg ccgtggacct tccacgtcgg ctatcgctac 1440
gcctggtag                                     1449

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<210> 42

<211> 482

<212> PRT

<213> Bordetella pertussis

<400> 42

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Asp Arg Val Ile Ser Gly Ile Leu Gln Asp Leu Gly Ser Trp Leu
      20          25          30
Ala Pro Asp Ala Ala Lys Arg Ser Pro Ser Glu Pro Gly Lys Ala Ala
      35          40          45
Glu Lys Ile Gly Val Met Pro Asn Glu Asp Leu Gly Lys Trp Leu Val
      50          55          60
Pro Gly Ala Gln Lys Asn Asn Pro Pro Glu Pro Gly Lys Thr Leu Asp
      65          70          75          80
Glu Ile Arg Ala Gly Leu Glu Lys Trp Val Ala Pro Gly Ser Lys Pro
      85          90          95
Pro Val Glu Pro Asp Pro Asp Lys Ala Thr Gln Ala Tyr Arg Lys Asp
      100          105          110
Leu Asp Lys Trp Leu Ala Pro Pro Ala Lys Ser Gly Pro Pro Glu Ala
      115          120          125
Pro Pro Val Val Gln Pro Glu Ala Pro Pro Gln Ala Gln Pro Glu Ala
      130          135          140
Pro Pro Val Val Pro Pro Ala Glu Pro Pro Ala Ala Arg Pro Pro
      145          150          155          160
Ala Val Pro Pro Ala Arg Pro Ala Gly Asp Ala Val Tyr Val Pro Gly
      165          170          175
Thr Arg Thr Leu Thr Pro Thr Ala Asn Ala Ala Val Gly Thr Ala Ser
      180          185          190
Ala Ala Gln Gly Leu Trp Gln Ala Glu Met Asn Ala Leu Ser Lys Arg
      195          200          205
Met Gly Glu Leu Arg Leu Thr Pro Val Ala Gly Gly Val Trp Gly Arg
      210          215          220
Ala Phe Gly Arg Arg Gln Asp Val Asp Asn Arg Val Ser Arg Glu Phe
      225          230          235          240
Arg Gln Thr Ile Ser Gly Phe Glu Leu Gly Ala Asp Thr Ala Leu Pro
      245          250          255
Val Ala Asp Gly Arg Trp His Val Gly Ala Val Ala Gly Tyr Thr Asn
      260          265          270
Gly Arg Ile Lys Phe Asp Arg Gly Gly Thr Gly Asp Asp Asp Ser Val
      275          280          285

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His	Val	Gly	Ala	Tyr	Ala	Thr	Tyr	Ile	Glu	Asp	Gly	Gly	Phe	Tyr	Met
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Asp	Gly	Ile	Val	Arg	Val	Ser	Arg	Ile	Arg	His	Ala	Phe	Lys	Val	Asp
305				310						315					320
Asp	Ala	Lys	Gly	Arg	Arg	Val	Arg	Gly	Gln	Tyr	Arg	Gly	Asn	Gly	Val
			325					330					335		
Gly	Ala	Ser	Leu	Glu	Leu	Gly	Lys	Arg	Phe	Thr	Trp	Pro	Gly	Ala	Trp
		340					345					350			
Tyr	Val	Glu	Pro	Gln	Leu	Glu	Val	Ala	Ala	Phe	His	Ala	Gln	Gly	Ala
	355					360						365			
Asp	Tyr	Thr	Ala	Ser	Asn	Gly	Leu	Arg	Ile	Lys	Asp	Asp	Gly	Thr	Asn
	370					375					380				
Ser	Met	Leu	Gly	Arg	Leu	Gly	Leu	His	Val	Gly	Arg	Gln	Phe	Asp	Leu
385					390					395					400
Gly	Asp	Gly	Arg	Val	Val	Gln	Pro	Tyr	Met	Lys	Leu	Ser	Trp	Val	Gln
			405						410					415	
Glu	Phe	Asp	Gly	Lys	Gly	Thr	Val	Arg	Thr	Asn	Asp	Ile	Arg	His	Lys
		420						425					430		
Val	Arg	Leu	Asp	Gly	Gly	Arg	Thr	Glu	Leu	Ala	Val	Gly	Val	Ala	Ser
	435					440						445			
Gln	Leu	Gly	Lys	His	Gly	Ser	Leu	Phe	Gly	Ser	Tyr	Glu	Tyr	Ala	Lys
	450					455					460				
Gly	Ser	Arg	Gln	Thr	Met	Pro	Trp	Thr	Phe	His	Val	Gly	Tyr	Arg	Tyr
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Ala	Trp														

<210> 43

<211> 2280

<212> DNA

<213> Bordetella pertussis

<400> 43

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gtcgc	gatcg	agaat	gcgga	actgt	ctcga	gccag	cggca	tgtac	gccac	gttcg	gcgcg	180
caggt	cgata	tgaag	ggcgg	gcgcatt	ctg	gcgcaca	aca	ccaat	atcct	gggaag	ccag	240
ggttac	gccg	atggt	cccta	tggcg	gcgtg	gtcgt	gacag	aggac	ggtca	agtca	acctg	300
gaggg	gcgca	aggtc	agtg	aactg	gcctg	ggggc	gcgcg	gcttg	tggtt	gctgg	gcgac	360
aaggac	acca	gcccgc	gagc	cagcct	gcgc	aacac	cgcag	tccac	ggaga	ggtcg	ccgcc	420
attgc	gttg	ggttc	aatgg	cgagg	cgaac	atctc	ggggc	gcagc	ttgag	cgtag	aggat	480
ggggc	cg	tcacc	accct	gacgc	ccgat	gcagt	cagat	attact	acga	ctacg	ccttg	540
tccat	ggagc	atctg	ccagc	tgatg	cgccg	ttgac	gcgcg	tccgc	gtcac	gctgt	ccgat	600
ggcgc	gcgcg	ccagc	ggaga	aacgt	tgatc	gcgc	atggc	ggttg	ttgcc	catga	cgtg	660
cgctt	gagca	gcggg	gtcga	cgccc	gcggc	gacat	cg	tcga	ccgcc	ttccg	gcgcg	720
cccga	ttccg	cggag	caacc	ggatg	ccgag	ccgga	accgg	atgcc	gagct	ggaac	ccggac	780
gccgc	ggcgc	agtcg	gacgc	caagg	cgaat	gcgcg	ggtca	tggcg	caggt	agatg	ggcggg	840
gaacct	gttg	ccgtg	ccgat	cccgc	ccccct	tcgca	tcccg	atgcc	ccgat	cgacg	tggtc	900
atcgac	agcg	gtgccc	aatg	gcggg	gcatg	acca	agaccg	tcaat	gcgtt	gcgc	atcgag	960
gacgg	cacct	ggacc	gtcac	cggtg	cg	tg	ctcc	gcac	cct	gcagg	caggc	1020
aaggt	ggcgt	acgca	acgcc	tgccg	aaagc	gacgg	gagaat	tcaa	acac	cct	gcggg	1080
accct	ctcgg	gaagc	ggcct	gttcg	agatg	aacgc	ccagcg	ccgac	ctgag	cgatg	gcgac	1140
ctgct	gggtc	tg	tccgacga	ggccag	cggg	cagca	caagg	tgctg	ggtgcg	aggag	ccggc	1200
acgga	accca	ccggt	gtgga	aagcct	gacg	ctggt	tcgagc	tgccc	gaggg	cagcc	agacg	1260
aagtt	cacgc	ttgcc	aaccg	gggcg	gggtg	gtcga	cgcgc	gcgcg	ttccg	ctatc	gcctg	1320
acgcc	ggaca	acggt	gtctg	ggcct	ggaa	cggac	cagcc	agctt	tcggc	cg	tcgcca	1380
gcggc	ccttga	atacc	ggggg	cgtgg	gcgcg	gccag	cagca	tctgg	tatgc	ggaag	gcaat	1440
gcgct	ctcca	agcgc	cctggg	cgag	ttgcg	ctcgat	ccccg	gcgcg	ggcg	cttct	ggggg	1500
cgcac	gttcg	cccaga	agca	gcag	ctcgac	aaca	aggctg	gccga	cgtt	cgacc	agaag	1560
gtgtac	gg	tcgag	ctggg	ggccg	accat	gccat	cg	cagca	agg	gcgct	ggcac	1620

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gtgggcgggc tgctgggcta taccgcgcga aggcgcagct tcatcgatga cggcgccggg 1680
cataccgaca gcgcgcatat cggggcctac gcggcgtacg tggcggacaa cggcttctat 1740
ttcgattcga cctgcgcgc cagccgcttc gagaacgact tcacggtaac ggccaccgac 1800
gccgtttccg tacggggcaa gtaccggggc aatggggtag ggcgccactt ggaggccggc 1860
aaacgtttca cggtgcacga cggctgggtc gtcgaacctc agtccgaggt gtcgctgttc 1920
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cgcgtgatcc agccctatgc caccctgagc tggctgcagg aattcaaagg cgtcacgacc 2100
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ctgggcctgg ccgccgcgtt ggggcgcggc caccagctct acacttcgta cgagtacgcc 2220
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<210> 44

<211> 759

<212> PRT

<213> Bordetella pertussis

<400> 44

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Met Cys Asp Thr Cys Arg Asp Asp Asp Gly Thr Ser Pro Ser Ile Arg
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Val Gln Gly Gly Val Val Gln Gly Gly Met Gly Ala Asn Asn Val Ala
20          25          30
Val Val Ala Thr Gly Ser Gly Lys Val Ala Ile Glu Asn Ala Glu Leu
35          40          45
Leu Gly Ala Ser Gly Met Tyr Ala Thr Phe Gly Ala Gln Val Asp Met
50          55          60
Lys Gly Gly Arg Ile Leu Ala His Asn Thr Asn Ile Leu Gly Ser Gln
65          70          75          80
Gly Tyr Ala Asp Gly Pro Tyr Gly Gly Val Val Val Thr Glu Asp Gly
85          90          95
Gln Val Asn Leu Glu Gly Ala Lys Val Ser Ala Thr Gly Leu Gly Ala
100         105         110
Ala Gly Leu Trp Leu Leu Gly Asp Lys Asp Thr Ser Pro Arg Ala Ser
115         120         125
Leu Arg Asn Thr Asp Val His Gly Glu Val Ala Ala Ile Ala Leu Gly
130         135         140
Phe Asn Gly Glu Ala Asn Ile Ser Gly Gly Ser Leu Ser Val Glu Asp
145         150         155         160
Gly Ala Val Leu Thr Thr Leu Thr Pro Asp Ala Val Glu Tyr Tyr Tyr
165         170         175
Asp Tyr Ala Leu Ser Met Glu His Leu Pro Ala Asp Ala Pro Leu Thr
180         185         190
Pro Val Arg Val Thr Leu Ser Asp Gly Ala Arg Ala Ser Gly Glu Thr
195         200         205
Leu Ile Ala His Gly Gly Leu Leu Pro Met Thr Leu Arg Leu Ser Ser
210         215         220
Gly Val Asp Ala Arg Gly Asp Ile Val Thr Leu Pro Pro Ser Ala Pro
225         230         235         240
Pro Asp Ser Ala Glu Gln Pro Asp Ala Glu Pro Glu Pro Asp Ala Glu
245         250         255
Leu Glu Pro Asp Ala Ala Ala Gln Ser Asp Ala Lys Ala Asn Ala Arg
260         265         270
Val Met Ala Gln Val Asp Gly Gly Glu Pro Val Ala Val Pro Ile Pro
275         280         285
Ala Pro Ser His Pro Asp Ala Pro Ile Asp Val Phe Ile Asp Ser Gly
290         295         300
Ala Gln Trp Arg Gly Met Thr Lys Thr Val Asn Ala Leu Arg Ile Glu
305         310         315         320
Asp Gly Thr Trp Thr Val Thr Gly Ser Ser Thr Val Asn Ser Leu His
325         330         335

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<210> 45
<211> 1548
<212> DNA
<213> Bordetella pertussis
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<400> 45

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cggccgggct tgcgcgtcgg gctggaccag gcgcgcgtcg agctcgatgt ggccgacggc 180
gcgcagtggc atggcgcgac tcagtcgctt gacaggctgg ccctgggcgc gggcgggcaa 240
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gtgttcggcg atgcggccgg accgggtttt caaacgctga cgggtgcgcac cctggcgggc 360
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tcgaaggcac aggccgtgct ggtgcgcgcg cccgcagacg gcaaggccag tttcgaactc 540
gacggcagcg acggcagggc cgacttcggc acctatcgct acgggctggc gcagcagccg 600
ggcggcgcct ggggcctagt caggacgggg tattctcca ccgcgcgcg ggcgctggat 660
accggcgagc tgggcgcggt gcaggggttg tggtatgccg aatccaacgc gttgggcaag 720
cgcatggggc aattgcgcct gaaccgggac gccggcggcg cctggggccg ggcgttcagc 780
cagcgccagc gcatcagtc gcgcgcgggc cggcatttcc agcaaggcgt cagcgccatc 840
gagctggggc ccgaccgggc ctggcccgtg gccggcgggc gttggcatgc gggctggttg 900
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gccgcgctgg gcaagggcca caatctgtac gcgtcgtagc agtacgcgca cgggcccagg 1500
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<210> 46

<211> 515

<212> PRT

<213> Bordetella pertussis

<400> 46

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20      25      30
Lys Asp Gly Phe Gly Thr Pro Val Arg Pro Gly Leu Arg Val Gly Leu
35      40      45
Asp Gln Ala Pro Leu Glu Leu Asp Val Ala Asp Gly Ala Gln Trp His
50      55      60
Gly Ala Thr Gln Ser Leu Asp Arg Leu Ala Leu Gly Ala Gly Gly Gln
65      70      75      80
Trp Arg Met Ser Ala Ala Ser Ser Val Gly Glu Leu Ser Met Glu Pro
85      90      95
Gly Ala Ala Val Val Phe Gly Asp Ala Ala Gly Pro Gly Phe Gln Thr
100     105     110
Leu Thr Val Arg Thr Leu Ala Gly Ala Gly Ser Phe Glu Met Arg Ala
115     120     125
Asp Ala Ala Leu Glu His Ala Asp Gln Leu Val Val Thr Asp Gln Ala
130     135     140
Glu Gly Arg His Arg Val Trp Leu Arg Ala Pro Ala Gly Ala Glu Pro
145     150     155     160
Ser Lys Ala Gln Ala Val Leu Val Arg Ala Pro Ala Asp Gly Lys Ala
165     170     175
Ser Phe Glu Leu Asp Gly Ser Asp Gly Arg Ala Asp Phe Gly Thr Tyr
180     185     190
Arg Tyr Gly Leu Ala Gln Gln Pro Gly Gly Ala Trp Gly Leu Val Arg
195     200     205
Thr Gly Tyr Ser Ser Thr Ala Ala Ala Ala Leu Asp Thr Gly Gly Leu
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210	215	220
Gly Ala Val Gln Gly Leu Trp Tyr Ala Glu Ser Asn Ala Leu Gly Lys		
225	230	235
Arg Met Gly Glu Leu Arg Leu Asn Pro Asp Ala Gly Gly Ala Trp Gly		240
	245	250
Arg Ala Phe Ser Gln Arg Gln Arg Ile Ser Pro Arg Ala Gly Arg His		255
	260	265
Phe Gln Gln Gly Val Ser Gly Ile Glu Leu Gly Ala Asp Arg Ala Trp		270
	275	280
Pro Val Ala Gly Gly Arg Trp His Ala Gly Trp Leu Leu Gly Tyr Thr		285
	290	295
Arg Ala Ser Arg Gly Phe Ser Gly Gln Gly Lys Gly His Thr Asp Ser		300
305	310	315
Val His Val Gly Gly Tyr Ala Thr Tyr Ile Gly Ala Asn Gly Val Tyr		320
	325	330
Ala Asp Ala Thr Leu Arg Ala Ser Arg Phe Glu Asn Ser Phe Asp Ala		335
	340	345
Pro Gly Trp Ala Gly Arg Thr Val Ser Gly Ser Tyr Arg Ala Asn Gly		350
	355	360
Val Gly Val Thr Leu Glu Ala Gly Arg Arg Leu Ala Leu Asp Arg His		365
	370	375
Trp Phe Val Glu Pro Gln Ala Glu Leu Ala Trp Phe Arg Ala Gly Gly		380
385	390	395
Gly Thr Tyr Thr Ala Ser Asn Gly Leu Arg Ile Glu Asp Asp Gly Gly		400
	405	410
Thr Ser Leu Gln Ala Arg Val Gly Ala Gln Ala Gly Arg Arg Phe Asp		415
	420	425
Leu Arg Gly Gly Ala Val Val Gln Pro Tyr Ala Gln Leu Ser Trp Val		430
	435	440
Gln Glu Leu Lys Gly Val Ser Thr Val Arg Thr Asn Gly Ile Ala His		445
	450	455
Arg Thr Asp Leu Gly Ala Gly Arg Val Glu Leu Gly Leu Gly Val Ala		460
465	470	475
Ala Ala Leu Gly Lys Gly His Asn Leu Tyr Ala Ser Tyr Glu Tyr Ala		480
	485	490
His Gly Pro Arg Leu Ser Leu Pro Trp Thr Val Gln Leu Gly Tyr Arg		495
	500	505
Tyr Ala Trp		510
515		

<210> 47
 <211> 1194
 <212> DNA
 <213> Bordetella pertussis

<400> 47
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 aaaccccggc ctgggggtgga acccggacct gaggcggaac ctggtccgca ggggcagcct 180
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 ggcaaccccgc gcgctgggat ttacatgccc cgcagcggca tcttgaccgc accggttctg 300
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<211> 397

<212> PRT

<213> Bordetella pertussis

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Gly Ile Glu Ile Gly Ala Asp Thr Ala Leu Pro Ala Ala Glu Gly Arg
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Ala His Ser Ala Arg Gly Asn Ser Asp Ser Leu His Val Gly Ala Tyr
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Ala Thr Tyr Ile Gly Asp Gly Gly Phe Tyr Leu Asp Gly Ile Val Arg
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Val Asn Arg Tyr Glu His Asp Phe Arg Ala Asp Gly Gln Arg Gly Ala
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Pro Ser Gly Met Asn Glu Arg Val Thr Val Asn Gln Gly Ala Arg Ile
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Glu Thr Asn Ala Ser Ala Ala Ile Ser Val Gly Thr Ser Gly Gln Val
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Ser Gly Gln Tyr Ala Lys Thr Leu Glu Ala Ala Ser Asn Asn Ile
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Ala	Thr	Ser	Arg	Arg	Leu	Glu	Leu	Thr	Gly	Arg	Gly	Ala	Val	Gln	Ala				
				1045					1050					1055					
Ala	Ala	Ala	Ala	Thr	Leu	Asp	Trp	Arg	Gly	Thr	Val	Ala	Gly	Ala	Gly				
				1060				1065					1070						
Thr	Leu	Val	Lys	Glu	Gly	Ala	Gly	Thr	Leu	Val	Leu	Ala	Gly	Asp	Asn				
		1075				1080						1085							
Gln	His	Ala	Gly	Gly	Thr	Glu	Val	Arg	Ala	Gly	Thr	Leu	Gln	Val	Ser				
	1090				1095						1100								
Arg	Ala	Thr	Asn	Leu	Gly	Pro	Gly	Ala	Leu	Ala	Leu	Glu	Asn	Ala	Ala				
	1105			1110						1115					1120				
Leu	Ala	Thr	Thr	Ala	Ser	Phe	Thr	Ala	Thr	Gln	Ala	Ala	Thr	Leu	Thr				
				1125					1130					1135					
Gly	Asn	Ala	Ala	Ile	Asp	Thr	Ala	Ala	Gly	Thr	Thr	Leu	Gly	Trp	Glu				
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Gly	Ala	Ile	Gly	Gly	Thr	Gly	Ser	Leu	His	Lys	Lys	Gly	Glu	Gly	Lys				
	1155					1160						1165							
Leu	Val	Leu	Val	Lys	Asp	Asn	His	His	Asp	Gly	Gly	Thr	Thr	Ile	His				
	1170					1175					1180								
Ala	Gly	Thr	Leu	Gln	Val	Ser	Arg	Asp	Ala	Asn	Leu	Gly	Ser	Gly	Gln				
	1185			1190						1195					1200				
Ser	Ala	Val	Thr	Leu	Asp	Gly	Gly	Ala	Leu	Ala	Val	Ser	Ala	Gly	Phe				
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Ser	Ser	Gly	Arg	Glu	Ile	Val	Val	Gly	Ala	Gly	His	Gly	Ala	Leu	Ser				
		1220						1225					1230						
Val	Thr	Gly	Gly	His	Thr	Leu	Gln	Trp	Gln	Gly	Gln	Val	Gly	Gly	Ala				
		1235					1240						1245						
Gly	Ala	Leu	Thr	Lys	Thr	Gly	Asp	Gly	Thr	Leu	Val	Leu	Glu	His	Asp				
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Asn	Thr	His	Ala	Gly	Gly	Thr	Arg	Ile	Thr	Gly	Gly	Val	Leu	Arg	Val				
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Ser	Arg	Asp	Glu	Asn	Leu	Gly	Glu	Ala	His	Gly	Met	Leu	Thr	Leu	Asp				
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Gly	Gly	Thr	Leu	Ser	Thr	Thr	Ala	Gly	Phe	Ala	Ser	Arg	Arg	Asn	Ala				
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Thr	Val	Gly	Asn	Gly	Gly	Gly	Arg	Ile	Val	Val	Ala	Asp	Ala	Ala	Thr				
		1315					1320					1325							
Leu	Asp	Leu	Gln	Gly	Asp	Val	Ala	Gly	Ala	Gly	Arg	Leu	Val	Lys	Glu				
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Thr Val Val Glu Ala Gly Thr Leu Arg Val Ala Arg Asp Ala Asn Leu						
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Gly Gly Gly Ala Leu Thr Leu Asn Asn Ser Arg Leu His Ala Thr Ala						
	1380		1385		1390	
Gly Phe Ala Thr Gly Arg Asp Ala Thr Leu Ser Gly Arg Ala Ser Ile						
	1395		1400		1405	
Asp Thr Asp Asp Arg Ala Thr Leu Gln Trp Arg Gly Thr Val Asn Gly						
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Ala Gly Arg Leu Val Lys Gln Gly Leu Gly Thr Leu Val Leu Asp Gly						
	1425		1430		1435	
Asp Asn Arg Tyr Ala Gly Gly Thr Glu Val Asn Ala Gly Thr Leu Gln						
	1445		1450		1455	
Val Ala Arg Asp Ala Asn Leu Gly Ala Gly Asp Val Ala Leu Asn Gly						
	1460		1465		1470	
Ser Ser Leu Ala Ala Thr Ala Ser Phe Ala Thr Ala Arg Thr Ala Thr						
	1475		1480		1485	
Leu Ser Gly Ala Ala Ala Ile Asp Thr Ala Asp Gly Ala Thr Leu Asp						
	1490		1495		1500	
Trp Asn Gly Leu Leu Asp Gly Asp Gly Ala Leu Val Lys Gln Gly Asn						
	1505		1510		1515	
Gly Thr Leu Ala Leu Ala Ala Ala Asn Arg Tyr Gly Gly Gly Thr Ile						
	1525		1530		1535	
Val Lys Ala Gly Ala Val Arg Ile Ala Arg Asp Ala Asn Leu Gly Arg						
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Ala Gly Thr Gly Val Thr Leu Asp Gly Gly Ala Leu Ala Thr Thr Ala						
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Asp Leu Ala Thr Gly Arg Ala Ala Thr Leu Gly Ala Ala Asn Gly Thr						
	1570		1575		1580	
Leu Asp Val Ala Ala Gly Thr Arg Leu Asp Trp Asn Gly Ala Ile Gly						
	1585		1590		1595	
Gly Ala Gly Ala Leu Thr Lys Thr Gly Ala Gly Thr Leu Ala Leu Asn						
	1605		1610		1615	
His Asp Asn Gln His Ala Gly Gly Thr Leu Val His Gly Gly Thr Leu						
	1620		1625		1630	
Arg Ile Ala Arg Asp Ala Asn Leu Gly Ala Ala Gly Thr Ala Val Thr						
	1635		1640		1645	
Leu Asp Gly Gly Thr Leu Ala Thr Thr Ala Ser Leu Ala Pro Glu Arg						
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Ala Leu Arg Val Gly Ala Arg Asn Gly Val Leu Leu Pro Asp Ala Gly						
	1665		1670		1675	
Thr Thr Leu Asp Trp Arg Gly Val Val Ala Gly Ala Gly Lys Leu Thr						
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Lys Ala Gly Pro Gly Thr Leu Val Leu Ser Ala Asp Asn Arg His Gly						
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Gly Gly Thr Ala Val Thr Gly Gly Thr Leu Gln Val Ser Arg Asp Ala						
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Asn Leu Gly Ala Ala Ala Gly Ala Leu Thr Leu Asp Gly Gly Thr Leu						
	1730		1735		1740	
Leu Ser Thr Ala Ser Phe Ala Ser Ala Arg Val Ala Thr Leu Asp Ala						
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Ala Gly Gly Thr Phe Val Thr Arg Asp Gly Thr Arg Leu Asp Trp Asp						
	1765		1770		1775	
Gly Ala Ile Gly Gly Ala Gly Gly Leu Val Lys Glu Gly Ala Gly Glu						
	1780		1785		1790	
Leu Arg Leu Gly Asn Ala Asn Thr Tyr Gln Gly Pro Thr Arg Ile Ala						
	1795		1800		1805	
Ala Gly Arg Leu Ala Val Asn Gly Ser Ile Ala Ser Pro Val Thr Val						
	1810		1815		1820	
Glu Gln Ala Gly Val Leu Gly Gly Thr Gly Arg Ile Val Gly Asp Val						
	1825		1830		1835	
					1840	

Ala	Asn	Arg	Gly	Val	Val	Ala	Pro	Gly	Asn	Ser	Ile	Gly	Ala	Leu	Thr	1845	1850	1855
Val	Ala	Gly	Asn	Tyr	Ala	Gly	Thr	Gly	Gly	Ser	Leu	Glu	Val	Glu	Ala	1860	1865	1870
Val	Leu	Gly	Gly	Asp	Ala	Ala	Pro	Ala	Asp	Arg	Leu	Val	Leu	Asp	Gly	1875	1880	1885
Gly	Ala	Ala	Ser	Gly	Val	Thr	Pro	Val	Val	Val	Lys	Pro	Gln	Gly	Gly	1890	1895	1900
Val	Gly	Gly	Leu	Thr	Leu	Arg	Gly	Ile	Pro	Val	Val	Val	Ala	Gln	Gly	1905	1910	1915
Gly	Ala	Thr	Thr	Ala	Pro	Gly	Ala	Phe	Arg	Leu	Ala	Gln	Pro	Leu	Val	1925	1930	1935
Ala	Gly	Ala	Tyr	Glu	Tyr	Gln	Leu	Leu	Arg	Gly	Ala	Gly	Asp	Gly	Ala	1940	1945	1950
Ala	Ala	Gln	Ala	Gln	Asp	Trp	Tyr	Leu	Arg	Thr	Ser	Arg	Val	Glu	Arg	1955	1960	1965
Asp	Lys	Ala	Gly	Arg	Ile	Val	Lys	Val	Val	Pro	Phe	Tyr	Arg	Pro	Glu	1970	1975	1980
Val	Ala	Leu	Tyr	Ala	Gly	Thr	Pro	Met	Leu	Met	Arg	Met	Val	Gly	Thr	1985	1990	1995
Glu	Ala	Leu	Gly	Ser	Tyr	Arg	Glu	Arg	Ala	Gly	Gln	Pro	Gly	Ala	Ala	2005	2010	2015
Ala	Pro	Glu	Ala	Gly	Ala	Ala	Ala	Arg	Arg	Gly	Val	Trp	Ala	Arg	Thr	2020	2025	2030
Phe	Gly	Arg	Arg	Phe	Glu	Arg	Ser	Ala	Gly	Ser	Glu	Ala	Ala	Pro	Ser	2035	2040	2045
Phe	Asn	Gly	Ser	Leu	Ala	Gly	Met	Gln	Leu	Gly	Ala	Asp	Leu	Tyr	Thr	2050	2055	2060
Arg	Arg	Ser	Ala	Thr	Arg	His	Ala	Asp	Ala	Phe	Gly	Val	Phe	Gly	Gly	2065	2070	2075
Tyr	Ala	Thr	Ala	Arg	Gly	Asp	Val	Arg	Gly	Leu	Ala	Arg	Gly	Glu	Ile	2085	2090	2095
Gln	Ala	Val	Gly	Thr	Ser	Thr	Leu	Arg	Ala	Ala	Gln	Leu	Gly	Ala	Tyr	2100	2105	2110
Trp	Thr	His	Thr	Gly	Pro	Ser	Gly	Trp	Tyr	Val	Asp	Thr	Val	Leu	Ala	2115	2120	2125
Gly	Thr	Arg	Tyr	Lys	Gln	Gln	Thr	Ser	Ser	Ser	Ala	His	Val	Gly	Ala	2130	2135	2140
Thr	Ser	Arg	Gly	Trp	Gly	Met	Met	Ala	Ser	Val	Glu	Ala	Gly	Tyr	Pro	2145	2150	2155
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Tyr	Gln	Gln	Leu	Gly	Ile	Ala	Asn	Gly	Ala	Asp	Arg	Val	Ser	Ser	Val	2180	2185	2190
Ser	Tyr	Lys	Thr	Pro	Asp	Ala	Leu	Thr	Gly	Arg	Leu	Gly	Thr	Arg	Leu	2195	2200	2205
Ala	Gly	Gln	Tyr	Ala	Tyr	Gly	Lys	Ala	Gln	Leu	Arg	Pro	Phe	Met	Gly	2210	2215	2220
Val	Ser	Leu	Leu	His	Asp	Phe	Thr	Gly	Ala	Asp	Thr	Val	Thr	Phe	Ala	2225	2230	2235
Gly	Val	His	Ser	Val	Arg	Ala	Ser	Arg	Gln	Asn	Thr	Ala	Val	Asp	Leu	2245	2250	2255
Lys	Ala	Gly	Val	Asp	Thr	Gln	Leu	Gly	Lys	Ser	Val	Gly	Leu	Trp	Gly	2260	2265	2270
Gln	Val	Gly	Tyr	Gly	Lys	Ser	Val	Gly	Ser	Gly	Asp	Gly	Ser	Asp	Arg	2275	2280	2285
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 <213> Bordetella pertussis

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 <212> PRT
 <213> Bordetella pertussis

<400> 52
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Ala	Pro	Ala	Ser	Gly	Gln	Ser	Val	Gln	Cys	Asp	Gly	Ala	Val	Val	Asn
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Gln	Ser	Val	Glu	Ala	Ala	Ala	Gly	Ser	Gln	Asn	Val	Thr	Ile	Thr	Val
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Asp	Asp	Arg	Ser	Arg	Ile	Val	Asn	Glu	Gly	Thr	Ile	Gln	Met	Ala	Gly
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Gly	Ile	Ser	Val	Pro	Asn	Val	Gly	Ser	Thr	Gly	Thr	Leu	Val	Asp	Asn
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Ser	Gly	Ser	Ile	Arg	Thr	Gln	Gly	Ala	Ser	Ala	His	Gly	Ile	Ala	Ile
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Asn	Gly	Phe	His	Ala	Arg	Val	Glu	Asn	Leu	Pro	Gly	Gly	Arg	Ile	Leu
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Ser	Asp	His	Ser	Tyr	Ala	Leu	Arg	Gly	Gln	Asn	Gly	Asn	Asp	Thr	Phe
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Ile	Asn	Ala	Gly	Tyr	Leu	Gln	Gly	His	Gly	Gly	Ala	Gly	Arg	Asp	Thr
		275					280					285			
Ala	Val	Tyr	Met	Gly	Pro	Gln	Gly	Thr	Gly	Thr	Leu	Ile	Leu	Arg	Thr
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Gly	Ser	Ala	Ile	Ala	Gly	Leu	Ala	Asp	Gly	Gly	Gly	Ala	Ala	Ser	His
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Ala	Tyr	Leu	Glu	Gly	Ser	Gly	Thr	Val	Asp	Asn	Arg	Phe	Ala	Asn	Phe
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Arg	Thr	Leu	Thr	Met	Arg	Gly	Ala	Asp	Trp	Arg	Trp	Thr	Ser	Asp	Ala
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Gly	Thr	Leu	Ala	Ser	Pro	Ala	Asn	Arg	Leu	Ala	Ala	Gly	Ala	Val	Leu
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385					390					395					400
Arg	Pro	Gly	Pro	Asn	Asp	Gly	Ser	Gly	Tyr	Gly	Ala	Leu	Thr	Val	Arg
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Ala	Gly	Gly	Ser	Thr	Pro	Val	Thr	Val	Val	Asn	Arg	Gly	Gly	Gln	Gly
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Ala	Leu	Thr	Ala	Ala	Asp	Gly	Ile	Leu	Val	Val	Gln	Ala	Ile	Asn	Gly
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Ala	Ser	Ser	Asp	Ala	Gly	Ala	Phe	Ser	Leu	Ala	Ala	Pro	Leu	Asn	Ala
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Gly	Ala	Tyr	Glu	Tyr	Arg	Leu	Tyr	Arg	Gly	Gly	Ala	Thr	Gly	Ala	Ala
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Pro	Asp	Ser	Trp	Tyr	Leu	Arg	Ser	Arg	Ala	Tyr	Leu	Val	Glu	Asp	Gln
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Leu	Ala	Gly	Ser	Leu	Ala	Glu	Ala	Glu	Ala	Ile	Ala	Asp	Asp	Ile	Gly
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Arg	Arg	Thr	Gly	Glu	Arg	Pro	Ser	Ile	Glu	Asp	Thr	Pro	Leu	Tyr	Arg
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Pro	Glu	Val	Ala	Leu	Tyr	Ser	Ser	Ile	Pro	Met	Leu	Ala	Arg	Arg	Met
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Gly	Gly	Asn	Ser	Lys	Gln	Ala	Leu	Asp	Gly	Asp	Ala	Gln	Pro	Gly	Ile
	610					615					620				
Asp	Ala	Arg	Leu	Ala	Gly	Val	Gln	Leu	Gly	Gln	Asp	Leu	Tyr	Ser	Ser
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Val	Arg	Pro	Asp	Gly	Gly	Gln	His	Arg	Phe	Gly	Leu	Phe	Gly	Gly	Tyr
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Gly	Gln	Ala	Arg	Gly	Asp	Thr	His	Gly	Ser	Ala	Gly	Gly	Glu	Arg	Asp
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Ala	Ala	Thr	Gly	Arg	Leu	Thr	Ile	Asp	Gly	Tyr	Ser	Val	Gly	Gly	Tyr
		675					680						685		
Trp	Thr	Tyr	Val	Gly	Pro	Arg	Gly	Trp	Tyr	Val	Asp	Ala	Val	Leu	Ala
	690					695					700				
Asn	Thr	Trp	Met	Asp	Ile	Asp	Thr	Asp	Ser	Lys	Ala	Gly	Arg	Asp	Ala
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Asp	Thr	Arg	Gly	Gln	Ala	Phe	Thr	Ala	Ser	Leu	Glu	Ser	Gly	Tyr	Pro
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Leu	Ala	Leu	Ser	Glu	Arg	Trp	Thr	Leu	Glu	Pro	Gln	Ala	Gln	Leu	Ile
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Tyr	Gln	His	Thr	Arg	Val	Asp	Gly	Phe	Ser	Asp	Ala	Val	Ser	Glu	Val
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Arg	Ile	Arg	Asp	Asp	Asn	Ala	Leu	Thr	Ala	Arg	Leu	Gly	Ala	Arg	Leu
	770					775					780				
Gln	Gly	Glu	Tyr	Ala	Ala	Ala	Ala	Gln	Val	Trp	Arg	Pro	Tyr	Ala	Ala
785					790					795					800
Leu	Asn	Phe	Trp	Arg	Thr	Phe	Ser	Gly	Glu	Asn	Thr	Val	Val	Leu	Gly
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Glu	Asp	Ser	Ile	Asp	Thr	Arg	Arg	Gly	Ala	Thr	Ser	Leu	Glu	Leu	Ala
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Ala	Gly	Ala	Ser	Val	Thr	Leu	Ala	Arg	Ser	Leu	Ala	Leu	Tyr	Gly	Arg
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Leu	Ala	Tyr	Ala	Thr	Ser	Ile	Asp	Ser	Gln	Tyr	Leu	Arg	Gly	Ala	Ser
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<211> 3120

<212> DNA

<213> Bordetella pertussis

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<212> PRT

<213> Bordetella pertussis

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Arg	Asn	Ile	Lys	Leu	Ser	Ile	Ala	Gln	Arg	Phe					
		740						745							

<210> 57

<211> 1578

<212> DNA

<213> Bordetella pertussis

<400> 57

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gggcagcagg	ccgtgggccc	ggccggcgag	cggccggcgc	gcgaagccgc	ccaggacgtc	180
gcgcggccct	ggctggcccg	gcgcgcccag	ccgtgggcac	gcgaggtgct	gctgccgccg	240
gcgctgcgcg	ccgatgtcga	tacgaccctg	ctgttcgcgg	gcaaggccac	gctgcccgctg	300
ctggccgagc	gcctgcatcg	cgccaccggc	atcgccgtgc	gcgtgcatcc	cgacgcgctg	360
ctgccgcgcg	ccgccttcc	gccgcgcctg	gcggggcagg	ccgagctggc	ggccgagcct	420
cccgccccagg	ccgaactgcg	ggccggggccg	cgctccgttg	ccgacacgct	cgacgcgctg	480
gccgcgcagc	tgtacgtgca	ctggcgctac	catcgcgggc	ccatcgagtt	ctaccgcacc	540
gaaacgcggg	tcttcgatgt	gcgcacgctg	gcgctggccg	ccagcgcgca	ggctcggctg	600
ggccgcgcgc	gcagcggcga	gacgggcagt	ttcgaccatg	cctcgagcac	ggtgctcagc	660
gccgacgccg	gcaaggcgct	gcaggccgtg	cgggaccgcg	tcgccgcttt	cctgacgcgc	720
gccggcgcca	tcgccgagat	cgaggcgggc	ggaagcacgc	tcgcggtcac	ggatacgccg	780
gaggcgctcg	cgcgcatcga	aaaatacctg	caaggcgaga	accgcgccct	gacgcgccgc	840
gtacgcctgg	tgttcgaaga	gctcacggtg	cgcaccacgg	ccgccgccga	aggcggcatc	900
gattggcagg	cggtctacgc	cagcgcgcgc	gccgcggcgt	cgtacgccat	gcccggcggg	960
gccggcgcg	caggcgcgct	cggggcccgc	gtgctggccg	ggccctggcg	cgacgcgcgc	1020
gcctgatcg	ccgcgctgag	caccatggga	gcggtactgc	gccatcgag	catacccatg	1080
ctgacgctga	accggcgcgc	cgtcacccac	gccgtgcgca	ccacgttttc	ctacgtggac	1140
caggtgcagc	gcctgagccc	gaccgcggcg	gcgcccgggtg	ggcgcgatgc	cgtgcccggg	1200
ctggcggtgc	agcagaagcg	cgagacgggtg	ggcacgttcc	tcacgctgtt	gcccaggcgc	1260
cgcatgacg	gccgcattcc	gctctccatt	tcctatgaca	acaccattgc	ccagccgctg	1320
cgcaccctga	ccttcggcga	gggcgggccag	caagtgtcgc	tgcagcagat	cgccatcgac	1380
ggcagcggca	tcgtgcagca	ggtcgagctg	ctgcccggcc	agcccgatc	cctgtcgggc	1440
ttcgaccaca	gcgaagacca	atacgaacgc	caccgcctgt	ttcccgatgc	gccgctcgcg	1500
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cagatcgacg	agggttga					1578

<210> 58
 <211> 525
 <212> PRT
 <213> Bordetella pertussis

<400> 58
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 1 5 10 15
 Gly Cys Ser Leu Ser Gln Gln Met Gln Ala Met Arg Asp Ala Ala Thr
 20 25 30
 Ser Leu Arg Ala Arg Leu Leu Glu Gly Gln Gln Ala Val Gly Arg Ala
 35 40 45
 Gly Glu Arg Pro Ala Arg Glu Ala Ala Gln Asp Val Ala Arg Pro Trp
 50 55 60
 Leu Ala Gly Arg Ala Gln Pro Leu Ala Arg Glu Val Leu Leu Pro Pro
 65 70 75 80
 Ala Leu Arg Ala Asp Val Asp Thr Thr Leu Leu Phe Ala Gly Lys Ala
 85 90 95
 Thr Leu Pro Val Leu Ala Glu Arg Leu His Arg Ala Thr Gly Ile Ala
 100 105 110
 Val Arg Val His Pro Asp Ala Leu Leu Pro Arg Ala Ala Phe Leu Pro
 115 120 125
 Arg Leu Ala Gly Gln Ala Glu Leu Ala Ala Glu Pro Pro Ala Gln Ala
 130 135 140
 Glu Leu Arg Ala Gly Pro Arg Pro Leu Ala Asp Thr Leu Asp Ala Leu
 145 150 155 160
 Ala Ala Gln Leu Tyr Val His Trp Arg Tyr His Arg Gly Ala Ile Glu
 165 170 175
 Phe Tyr Arg Thr Glu Thr Arg Val Phe Asp Val Arg Thr Leu Ala Leu
 180 185 190
 Ala Ala Ser Ala Gln Ala Arg Leu Gly Arg Ala Gly Ser Gly Glu Thr
 195 200 205
 Gly Ser Phe Asp His Ala Ser Ser Thr Val Leu Ser Ala Asp Ala Gly
 210 215 220
 Lys Ala Leu Gln Ala Val Arg Asp Arg Val Ala Phe Leu Thr Arg
 225 230 235 240
 Ala Gly Val Ile Ala Glu Ile Glu Ala Gly Gly Ser Thr Leu Ala Val
 245 250 255
 Thr Asp Thr Pro Glu Ala Leu Ala Arg Ile Glu Lys Tyr Leu Gln Gly
 260 265 270
 Glu Asn Arg Ala Leu Thr Arg Arg Val Arg Leu Val Phe Glu Glu Leu
 275 280 285
 Thr Val Arg Thr Thr Ala Ala Ala Glu Gly Gly Ile Asp Trp Gln Ala
 290 295 300
 Val Tyr Ala Ser Ala Arg Ala Ala Ala Ser Tyr Ala Met Pro Gly Gly
 305 310 315 320
 Ala Gly Ala Ala Gly Ala Leu Gly Ala Arg Val Leu Ala Gly Pro Trp
 325 330 335
 Arg Asp Ala Arg Ala Leu Ile Ala Ala Leu Ser Thr Met Gly Ala Val
 340 345 350
 Leu Arg His Arg Ser Ile Pro Met Leu Thr Leu Asn Arg Arg Ala Val
 355 360 365
 Thr His Ala Val Arg Thr Thr Phe Ser Tyr Val Asp Gln Val Gln Arg
 370 375 380
 Leu Ser Pro Thr Ala Ala Ala Pro Gly Gly Arg Asp Ala Val Pro Gly
 385 390 395 400
 Leu Ala Val Gln Gln Lys Arg Glu Thr Val Gly Thr Phe Leu Thr Leu
 405 410 415
 Leu Pro Glu Ala Arg Asp Asp Gly Arg Ile Leu Leu Ser Ile Ser Tyr
 420 425 430

Asp	Asn	Thr	Ile	Ala	Gln	Pro	Leu	Arg	Thr	Leu	Thr	Phe	Gly	Glu	Gly
	435					440					445				
Gly	Gln	Gln	Val	Ser	Leu	Gln	Gln	Ile	Ala	Ile	Asp	Gly	Ser	Gly	Ile
	450					455					460				
Val	Gln	Gln	Val	Glu	Leu	Leu	Pro	Gly	Gln	Pro	Val	Ile	Leu	Ser	Gly
	465				470					475					480
Phe	Asp	His	Ser	Glu	Asp	Gln	Tyr	Glu	Arg	His	Arg	Leu	Phe	Pro	Asp
			485						490					495	
Ala	Pro	Leu	Ala	Ala	Gly	Gly	His	Asp	Arg	Thr	Ala	Arg	Glu	Arg	Val
		500						505					510		
Thr	Thr	Val	Val	Met	Val	Thr	Ala	Gln	Ile	Asp	Glu	Gly			
	515						520					525			

<210> 59
 <211> 1512
 <212> DNA
 <213> Bordetella pertussis

<400> 59
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 ggccccgacc tgttcgacat cgtcgcgctg cgcgcgatgg gctcggccac cgacagcacg 180
 gccccgcggg gccagacgcg ccgggtgggtc tattacgatg tgggtgctggg cctgaagaag 240
 gacctcacc tgggcgcctg ggaccagccc ggcgccggcg cgctggtcag cctgctgggc 300
 gccggggcgc gcagcatctc gggggtgaaa tccagcggca atgccgccgg cgaccagatc 360
 gtgcgccacg ccagcgccat ctaccagcgc gacgcagagc aatgggtgca cgtcgccccg 420
 gccagcttca cggccaccga agcgccctcg ctggacaccg gcgcgcgcgc gccggtgacg 480
 cgccagctgc tccagacgct ggagcagatc acgcgttccg tgccctacag cgcctccagc 540
 accgcccagc acgtggtgca acaggagctg gacgcctcgg tggcgcgcat caatggccgg 600
 cttgcccgcg tgcaaaaggg ctaccgcgctg gcgaccggcc ccgacaaggg cgagtacctg 660
 gcgttcggcc aggcgctggc cgcgatcggg cgcaacgagc aggtgcgcgt cattccccctc 720
 attaccggcg gcagcgcgga caacatggcc atgctgcgca gcggcgcggc ggtggccgcc 780
 ctgtcgcagg ccgacatcgc gcaactggcc tacgagggca aggggcccgt cgaaagccag 840
 ggaccgttct ccgggttgcg cgcgctgggc agcctgtatc cggagctggt gcacatcgtg 900
 gtgcgccagg gcgatggcat cgccacgggt ggcgcgctgc gcggcaagaa gattgccctg 960
 ggcccgtcgg gctcggcggt acgcaccacg ctggagaccg tgctggcagc ccatgggctg 1020
 cagccggggc gcgactatgc agtcatcgac acgcggcgcc ccgcggccct gccgcagctg 1080
 agcgaaggac gggctcgacgc ggtggcgagc gtcatcggtc cgccggccgc gcccttgctg 1140
 gcggcgctga ccagggcgcg cctggcgctg ctgccgctgg accgggctgc gatcgacaag 1200
 ctggtgcagg ccgatccgac cctgatggcg ctggacatcc cggccaacac ctaccccagc 1260
 caggccgcgg ccacccccac ggtgggcatg gcggcgctgc tggtcaccac ggccgatctg 1320
 acgcgcgacg aggcgcgcga tatggtggac gtggtatacc gggccgggca ggacctgctg 1380
 gccgcggggt ccgcgcaggg cgcgcgaggt tccgcggcca acgcggggcg cggattgagc 1440
 attcccctgc acgacggcgc cgtggaagcc ttcgagaaac tgggcgcgcc gccctgccc 1500
 gagggcaggt ag 1512

<210> 60
 <211> 503
 <212> PRT
 <213> Bordetella pertussis

<400> 60
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 20 25 30
 Gly Gln Thr Leu Ala Ala Thr Tyr Gly Pro Asp Leu Phe Asp Ile Val
 35 40 45
 Ala Leu Arg Arg Met Gly Ser Ala Thr Asp Ser Thr Ala Pro Pro Gly
 50 55 60

Gln	Thr	Arg	Arg	Val	Val	Tyr	Tyr	Asp	Val	Val	Leu	Gly	Leu	Lys	Lys	65	70	75	80
Asp	Leu	Thr	Leu	Gly	Ala	Trp	Asp	Gln	Pro	Gly	Ala	Ala	Ala	Leu	Val				
				85					90					95					
Ser	Leu	Leu	Gly	Ala	Gly	Pro	Arg	Ser	Ile	Ser	Gly	Val	Lys	Ser	Ser				
			100					105					110						
Gly	Asn	Ala	Ala	Gly	Asp	Gln	Ile	Val	Ala	His	Ala	Ser	Ala	Ile	Tyr				
			115					120					125						
Gln	Arg	Asp	Ala	Glu	Gln	Trp	Val	His	Val	Ala	Pro	Ala	Ser	Phe	Thr				
			130					135				140							
Ala	Thr	Glu	Ala	Pro	Ser	Leu	Asp	Thr	Gly	Ala	Pro	Pro	Pro	Val	Thr				
145						150				155					160				
Arg	Gln	Leu	Leu	Gln	Thr	Leu	Glu	Gln	Ile	Thr	Arg	Ser	Val	Pro	Tyr				
				165					170					175					
Ser	Ala	Ser	Ser	Thr	Ala	Gln	His	Val	Val	Gln	Gln	Glu	Leu	Glu	Arg				
			180					185					190						
Ser	Val	Ala	Arg	Ile	Asn	Gly	Arg	Leu	Ala	Arg	Leu	Gln	Lys	Gly	Tyr				
			195				200					205							
Pro	Leu	Ala	Thr	Gly	Pro	Asp	Lys	Gly	Glu	Tyr	Leu	Ala	Phe	Gly	Gln				
			210			215					220								
Ala	Leu	Ala	Ala	Ile	Gly	Arg	Asn	Glu	Gln	Val	Arg	Val	Ile	Pro	Leu				
225					230					235					240				
Ile	Thr	Gly	Gly	Ser	Ala	Asp	Asn	Met	Ala	Met	Leu	Arg	Ser	Gly	Ala				
				245					250					255					
Ala	Val	Ala	Ala	Leu	Ser	Gln	Ala	Asp	Ile	Ala	Gln	Leu	Ala	Tyr	Glu				
			260					265					270						
Gly	Lys	Gly	Pro	Phe	Glu	Ser	Gln	Gly	Pro	Phe	Ser	Gly	Leu	Arg	Ala				
		275					280				285								
Leu	Gly	Ser	Leu	Tyr	Pro	Glu	Leu	Val	His	Ile	Val	Val	Arg	Gln	Gly				
		290				295					300								
Asp	Gly	Ile	Ala	Thr	Val	Gly	Ala	Leu	Arg	Gly	Lys	Lys	Ile	Ala	Leu				
305					310					315					320				
Gly	Pro	Ser	Gly	Ser	Ala	Val	Arg	Thr	Thr	Leu	Glu	Thr	Val	Leu	Ala				
				325					330					335					
Ala	His	Gly	Leu	Gln	Pro	Gly	Arg	Asp	Tyr	Ala	Val	Ile	Asp	Thr	Pro				
			340					345					350						
Ala	Ala	Ala	Ala	Leu	Pro	Gln	Leu	Ser	Glu	Gly	Arg	Val	Asp	Ala	Val				
			355				360					365							
Ala	Gln	Val	Ile	Gly	Thr	Pro	Ala	Ala	Pro	Leu	Arg	Ala	Ala	Leu	Thr				
			370			375					380								
Gln	Ala	Arg	Leu	Ala	Leu	Leu	Pro	Leu	Asp	Arg	Ala	Ala	Ile	Asp	Lys				
385					390					395					400				
Leu	Val	Gln	Ala	Asp	Pro	Thr	Leu	Met	Ala	Leu	Asp	Ile	Pro	Ala	Asn				
				405					410				415						
Thr	Tyr	Pro	Ser	Gln	Ala	Ala	Ala	Ile	Pro	Thr	Val	Gly	Met	Ala	Ala				
			420					425					430						
Leu	Leu	Val	Thr	Thr	Ala	Asp	Leu	Thr	Arg	Asp	Glu	Ala	Ala	His	Met				
			435				440					445							
Val	Asp	Val	Val	Tyr	Arg	Ala	Gly	Gln	Asp	Leu	Leu	Ala	Ala	Gly	Ser				
			450			455					460								
Ala	Gln	Gly	Ala	Gln	Val	Ser	Ala	Ala	Asn	Ala	Gly	Arg	Gly	Leu	Ser				
465					470				475						480				
Ile	Pro	Leu	His	Asp	Gly	Ala	Val	Glu	Ala	Phe	Glu	Lys	Leu	Gly	Ala				
				485					490					495					
Pro	Pro	Leu	Pro	Glu	Gly	Arg													
			500																

<210> 61

<211> 1494

<212> DNA

<213> Bordetella pertussis

<400> 61

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gacgtggggg ccgcctacaa ggaggccgcc gcgccgcagc ccggctggac gcccgcgcag 180
cccagcgacg agagcgcgcg cgggcaatgg tggcaggtgt atggcgaccc ggtgctcgac 240
ggcctggtgc agcaattgaa ccagggcaac tactccgtgg cgcaggccga ggccaattat 300
cgccaggccc aggcgtggt gcgcaatgcg cgcgccggct tcttccccac cataggcgcg 360
ggcgccgacg tgacgcggtc cggctcgggc ggccgcagcg gcgccggctc gaacggcagc 420
tcggtcggca accagtactc gctcagtggg tcggtcagct ggggaagtcga tgtgtggggc 480
cgggtgcgcc gcgaagtcga gtccagccgc gccgaggcgc aggccagcgc ggcggaacctg 540
gccgtcaccg gcctgagcgc gcaggccgcc ctggtgcaga actacctgca attgcgcgtg 600
ctcgacgagc agaaacgcct gctcgacgcc acggtgctgg cctacgagcg ctcgctgcgc 660
ctgacgcaga accgctacga agccggcgctg gtgggcaagt ccgacgtggc ggtggcgcg 720
accagctgg agaacacgcg ggcccagtc atcgacctgg actggcagcg cggccagttc 780
gagcacgcca tcgcggtgct gatggggcag gcgccttcgc gcttcgccct gccggcgcg 840
ccgttcgcgc agcaactgcc ggacatcccg gcgggcctgc cctcgcaact gctggagcgc 900
cggcccgacg tggcgggcgc cgagcggcgc gcggccgcgc ccaatgcgca gatcggcgtg 960
gcgcaggcgc cctggttccc ggacctgacc ttgtcggcca gcggcggttt tcgcagcggc 1020
cagttcgccg agtggctgac cgcgccggcg cgcttctgga ccctcgggcc ggcgctggcc 1080
atgacgtgt tcgacggcgc cgcgcgttcg gcgcgcgtcg agcaggcccg cgccgcctat 1140
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ctgggcagcc ggctcaacgc cagcgtgcag ctgatcgcg cgctgggcgg cgggtggcag 1440
ggcttgccgg ccgaggcggc ggccagcgcg gcggccgagc cgtccgcgcc ctag 1494
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<210> 62

<211> 497

<212> PRT

<213> Bordetella pertussis

<400> 62

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Leu Ala Val Ala Ala Leu Cys Ala Ala Leu Gly Gly Cys Ala Val Gly
 20           25           30
Pro Asp Tyr Gln Arg Pro Ala Ile Asp Val Gly Ala Ala Tyr Lys Glu
 35           40           45
Ala Ala Ala Pro Gln Pro Gly Trp Thr Pro Ala Gln Pro Ser Asp Glu
 50           55           60
Ser Ala Arg Gly Gln Trp Trp Gln Val Tyr Gly Asp Pro Val Leu Asp
 65           70           75           80
Gly Leu Val Gln Gln Leu Asn Gln Gly Asn Tyr Ser Val Ala Gln Ala
 85           90           95
Glu Ala Asn Tyr Arg Gln Ala Gln Ala Leu Val Arg Asn Ala Arg Ala
100          105          110
Gly Phe Phe Pro Thr Ile Gly Ala Gly Ala Asp Val Thr Arg Ser Gly
115          120          125
Ser Gly Gly Gly Ser Gly Ala Gly Ser Asn Gly Ser Ser Val Gly Asn
130          135          140
Gln Tyr Ser Leu Ser Gly Ser Val Ser Trp Glu Val Asp Val Trp Gly
145          150          155          160
Arg Val Arg Arg Glu Val Glu Ser Ser Arg Ala Glu Ala Gln Ala Ser
165          170          175
Ala Ala Asp Leu Ala Val Thr Arg Leu Ser Ala Gln Ala Ala Leu Val
180          185          190
Gln Asn Tyr Leu Gln Leu Arg Val Leu Asp Glu Gln Lys Arg Leu Leu
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gcgccgctgg cgcgcgaatt gcccacgggc gacgtggcca tgctgctgca acgcccggcc 900
gacgtgcgcg ccgcccagcg cctgctgggc gccaccaacg ccgacgtcgg cgccatcacc 960
gccgaactgt atccgcgcac cgacctgggc gggttcctcg gtttcattgc cttgcgcggc 1020
ggcgacctgg gccaggccag cagcaaggcc ttcgcgctgg cgccgacgat cagctggccg 1080
gcgttgaccc tgggcagcgt ccaggcgag ctgcgcgcgg gccaggcccg gcacgacgcg 1140
gcgcggggcg gctacgaaca ggtggcgctg caggccatcg aggaagtgga aggcgcgttg 1200
acgcgctatg gacagaacca gcagcggtcg cgcgacctgc ttgacagcgc cacgcagagc 1260
cagcgcgccg ccgacctggc gcaaacgcgc tatcgtgaag gggccgcgcc gtatttgacg 1320
gtgctggacg cgcagcgtag tcttttgcg gcacaggatg ccgtggcgca atccgagtcg 1380
gagtcctata ccagcctggg cgcgctctac aaggccctgg gcggaggctg gaataccgac 1440
gccgcgcgcg ccgcccgttc cgcccgcacc gccgccctgc cggccagccc ctga 1494

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<210> 64

<211> 497

<212> PRT

<213> Bordetella pertussis

<400> 64

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Met Thr His Pro Val Pro Thr Thr Phe Ala Arg Thr Ala Gly Ala Leu
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20          25          30
Ala Pro Thr Pro Ala Pro Val Lys Leu Ala Ser Pro Glu Gln Ala Leu
35          40          45
Phe Ser Ala Asp Arg Leu Gln Arg Glu Trp Trp Arg Gln Leu Gln Asp
50          55          60
Ala Arg Leu Asp Ala Leu Ile Gly Leu Ala Leu Ala Arg Asn Leu Asp
65          70          75          80

Ile Gly Leu Ala Leu Ala Arg Asn Leu Asp Ile Arg Gln Ala Gln Ala
85          90          95
Arg Leu Arg Glu Ala Arg Ala Ala Leu Asp Glu Lys Glu Leu Asp Arg
100          105          110
Trp Pro Thr Val Thr Ala Ala Gly Gly Tyr Thr Arg Ser Leu Ser Gln
115          120          125
Ile Asn Pro Gly Pro Asp Gln Arg Asn Leu Ala Gln Ser Tyr Arg Ala
130          135          140
Gly Phe Asp Ala Thr Trp Glu Ile Asp Leu Phe Gly Arg Leu Gln Arg
145          150          155          160
Arg Ala Glu Ala Ala Ala Ala Arg Asp Gln Ala Ala Ala Ala Asp Leu
165          170          175
Ala Gln Thr Arg Leu Val Val Val Ala Glu Leu Ala Arg Asn Tyr Phe
180          185          190
Glu Met Arg Gly Ala Glu Gln Arg Leu Ala Val Ala Arg Ala Asn Leu
195          200          205
Ala Thr Gln Gln Glu Thr Leu Arg Val Thr Ala Ala Leu Val Glu Thr
210          215          220
Gly Arg Gly Tyr Ala Gly Asp Leu Ala Ser Ala Arg Ala Glu Leu Ala
225          230          235          240
Gly Thr Arg Ala Leu Leu Ala Pro Leu Glu Thr Gln Arg Arg Leu Ala
245          250          255
Gln Tyr His Ile Ala Val Leu Ala Ala Met Arg Pro Ala Glu Leu Gly
260          265          270
Glu Leu Arg Gln Glu Gln Pro Leu Ala Pro Leu Ala Ala Gln Leu Pro
275          280          285
Ile Gly Asp Val Ala Met Leu Leu Gln Arg Arg Pro Asp Val Arg Ala
290          295          300
Ala Glu Arg Leu Leu Ala Ala Thr Asn Ala Asp Val Gly Ala Ile Thr
305          310          315          320
Ala Glu Leu Tyr Pro Arg Ile Asp Leu Gly Gly Phe Leu Gly Phe Ile
325          330          335

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Ala Leu Arg Gly Gly Asp Leu Gly Gln Ala Ser Ser Lys Ala Phe Ala
 340 345 350
 Leu Ala Pro Thr Ile Ser Trp Pro Ala Leu His Leu Gly Ser Val Gln
 355 360 365
 Ala Gln Leu Arg Ala Gly Gln Ala Arg His Asp Ala Ala Arg Ala Arg
 370 375 380
 Tyr Glu Gln Val Ala Leu Gln Ala Ile Glu Glu Val Glu Gly Ala Leu
 385 390 395 400
 Thr Arg Tyr Gly Gln Asn Gln Gln Arg Leu Arg Asp Leu Leu Asp Ser
 405 410 415
 Ala Thr Gln Ser Gln Arg Ala Ala Asp Leu Ala Gln Thr Arg Tyr Arg
 420 425 430
 Glu Gly Ala Ala Pro Tyr Leu Thr Val Leu Asp Ala Gln Arg Thr Leu
 435 440 445
 Leu Arg Ala Gln Asp Ala Val Ala Gln Ser Glu Ser Glu Ser Tyr Thr
 450 455 460
 Ser Leu Val Ala Leu Tyr Lys Ala Leu Gly Gly Gly Trp Asn Thr Asp
 465 470 475 480
 Ala Ala Ala Pro Ala Arg Ser Ala Arg Thr Ala Ala Leu Pro Ala Ser
 485 490 495
 Pro

<210> 65
 <211> 1383
 <212> DNA
 <213> Bordetella pertussis

<400> 65
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 tgctcgctgg cgccaccta cgagcgcccg caggcgccgg tcgacgcggc ctatccgtcc 120
 ggcccggcct acggcgcgcc gggccaggcc gccgcgggcg cgccggccgc cgccgacgtg 180
 ggctggcgcg acttcttcgg cgaccgctg ctgcaggagc tgctggcgct gtcgctggcc 240
 aacaaccgcg acctgcggt cgccgcgctc aacgtggagg cggcgcgct caacccgagc 300
 ggacaggccg gcatcagccg cagctaccag gtcggtgcc gctgtcgac ctgggagctg 360
 gacctgttcg ggcgcatccg cagcctcagc gaacaggcgc tgcagctcta tctggcccag 420
 gacgaaacgc gcctggccac ccagctgacg ctggtggccg agaccgcaa cgcctaccgc 480
 accctgcgcg ccgaccagga actgctggcg ctgacgcgcc agacgctggc ggcccagcag 540
 gagtcgtaca agctgaccgc ccagagctac gacctgggcg tggcgaccga gctggacctg 600
 agccaggccg agatttcgct gcgcaccgcc gagcgcaatc tgtcgagta cacgcgcatg 660
 gcggcgagc accgcaacgc gctggtgctg ctggtgggcc agccgctgcc ggccggcatc 720
 ggcgcgagc tggaccaggc cgtggcgctg cccgacggcg tggctcctggc cgacctgccg 780
 gcgggcctgc cgtcggatct gctcgcgcgc cggccggata tccgcgcggc ggagcaccag 840
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 ctgaccggct cgcccgccac ggccagcgcc agcctgggcg gcctgttcga tgccgggtcg 960
 ggggcctgga gtttcgcgc gcagatcagc gtgccgatct tcgcgggagg ggcgctgcgc 1020
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<210> 66
 <211> 460
 <212> PRT
 <213> Bordetella pertussis

<400> 66

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Pro	Val	Asp	Ala	Ala	Tyr	Pro	Ser	Gly	Pro	Ala	Tyr	Gly	Ala	Pro	Gly
		35					40					45			
Gln	Ala	Ala	Ala	Gly	Ala	Pro	Ala	Ala	Ala	Asp	Val	Gly	Trp	Arg	Asp
	50					55					60				
Phe	Phe	Gly	Asp	Pro	Leu	Gln	Glu	Leu	Leu	Ala	Leu	Ser	Leu	Ala	
65					70				75					80	
Asn	Asn	Arg	Asp	Leu	Arg	Val	Ala	Ala	Leu	Asn	Val	Glu	Ala	Ala	Arg
				85					90					95	
Leu	Asn	Pro	Ser	Gly	Gln	Ala	Gly	Ile	Ser	Arg	Ser	Tyr	Gln	Val	Gly
			100				105						110		
Ala	Ser	Leu	Ser	Thr	Trp	Glu	Leu	Asp	Leu	Phe	Gly	Arg	Ile	Arg	Ser
		115				120						125			
Leu	Ser	Glu	Gln	Ala	Leu	Gln	Leu	Tyr	Leu	Ala	Gln	Asp	Glu	Thr	Arg
	130					135					140				
Leu	Ala	Thr	Gln	Leu	Thr	Leu	Val	Ala	Glu	Thr	Ala	Asn	Ala	Tyr	Pro
145					150				155						160
Thr	Leu	Arg	Ala	Asp	Gln	Glu	Leu	Leu	Ala	Leu	Thr	Arg	Gln	Thr	Leu
				165					170					175	
Ala	Ala	Gln	Gln	Glu	Ser	Tyr	Lys	Leu	Thr	Arg	Gln	Ser	Tyr	Asp	Leu
			180					185					190		
Gly	Val	Ala	Thr	Glu	Leu	Asp	Leu	Ser	Gln	Ala	Glu	Ile	Ser	Leu	Arg
	195						200					205			
Thr	Ala	Glu	Arg	Asn	Leu	Ser	Gln	Tyr	Thr	Arg	Met	Ala	Ala	Gln	Asp
	210				215						220				
Arg	Asn	Ala	Leu	Val	Leu	Leu	Val	Gly	Gln	Pro	Leu	Pro	Ala	Gly	Ile
225					230				235						240
Gly	Ala	Gln	Leu	Asp	Gln	Ala	Val	Ala	Leu	Pro	Asp	Gly	Val	Val	Leu
			245					250						255	
Ala	Asp	Leu	Pro	Ala	Gly	Leu	Pro	Ser	Asp	Leu	Leu	Ala	Arg	Arg	Pro
		260						265					270		
Asp	Ile	Arg	Ala	Ala	Glu	His	Gln	Leu	Gln	Ala	Ala	Asn	Ala	Ser	Ile
	275						280					285			
Gly	Ala	Ala	Arg	Ala	Ala	Phe	Phe	Pro	Arg	Ile	Ser	Leu	Thr	Gly	Ser
	290					295					300				
Ala	Gly	Thr	Ala	Ser	Ala	Ser	Leu	Gly	Gly	Leu	Phe	Asp	Ala	Gly	Ser
305					310				315					320	
Gly	Ala	Trp	Ser	Phe	Ala	Pro	Gln	Ile	Ser	Val	Pro	Ile	Phe	Ala	Gly
			325						330					335	
Gly	Ala	Leu	Arg	Ala	Ser	Leu	Asp	Leu	Ala	Lys	Ile	Gln	Lys	Asp	Ile
		340						345					350		
Gly	Ile	Ala	Arg	Tyr	Glu	Gln	Ala	Ile	Gln	Ser	Gly	Phe	Arg	Glu	Val
	355						360					365			
Ser	Asp	Ala	Leu	Ala	Gly	Arg	Gly	Thr	Leu	Gln	Glu	Gln	Ile	Arg	Ser
	370					375					380				
Gln	Glu	Leu	Leu	Val	Gln	Ala	Asn	Gln	Arg	Ala	Tyr	Asp	Leu	Ser	Gln
385					390					395					400
Gln	Arg	Tyr	Gln	Gln	Gly	Ile	Asp	Asn	Tyr	Leu	Ser	Val	Leu	Asp	Ser
			405						410					415	
Gln	Arg	Ser	Leu	Tyr	Thr	Ala	Gln	Gln	Thr	Leu	Val	Glu	Thr	Arg	Leu
		420						425					430		
Ala	Arg	Leu	Ser	Asn	Leu	Ile	Gln	Leu	Tyr	Lys	Ala	Leu	Gly	Gly	Gly
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Trp	Ser	Glu	Arg	Thr	Val	Ala	Ala	Ala	Gln	Ala	Gly				
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<210> 67
 <211> 1350
 <212> DNA
 <213> Bordetella pertussis

<400> 67
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 gaactgctgc tggaggtcaa gggccagcag ccgttgcgcc tggacgccgc gccatcgcg 180
 gtggcgatcg ccgatccgca ggtcgccgac gtcaaggtgc tggcgcccgg cgtgggcccgc 240
 ccgggcgagg tgctgctgat cggccggcag gccggcacca ccgagctgcg ggtctggagc 300
 cgcggtctcg gcgaccgca ggtctggacc gtgcgcgtgc tgccgcaagt gcaggccgcg 360
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 caggtggaag tgaagtggt cgagctggcg cgctcggtca tgaaggatgt cgggatcaat 600
 ttcagggccg acagcggccc gtggtcgggc ggcgtgtcgc tgctgccgga cctggccagc 660
 ggcggcatgt tcggcatgct gtcctatacc agccgcgatt tcagcgcgtc gctggcgctg 720
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 cagagcgcca gcttcctggc cggcgggcag attccgattc cggtatcggc cggcctgggt 840
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 ggggcgttct tccgcaacgt gcagtattcc caggaggatc gcgaattggt gatcgtggtc 1200
 acgccgcgcc tggttcgccc catcgcgcgc ggtgtcacgc tgcccttgcc gggcgcgcg 1260
 caggaggtca gcgacgtgg cttcaacgcc tggggctatt acctgctggg tccgatgagc 1320
 ggccagcaga tgccgggctt ttcacagtga 1350

<210> 68
 <211> 449
 <212> PRT
 <213> Bordetella pertussis

<400> 68
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 35 40 45
 Gln Gln Pro Leu Arg Leu Asp Ala Ala Pro Ser Arg Val Ala Ile Ala
 50 55 60
 Asp Pro Gln Val Ala Asp Val Lys Val Leu Ala Pro Gly Val Gly Arg
 65 70 75 80
 Pro Gly Glu Val Leu Leu Ile Gly Arg Gln Ala Gly Thr Thr Glu Leu
 85 90 95
 Arg Val Trp Ser Arg Gly Ser Arg Asp Pro Gln Val Trp Thr Val Arg
 100 105 110
 Val Leu Pro Gln Val Gln Ala Ala Leu Ala Arg Arg Gly Val Gly Gly
 115 120 125
 Gly Ala Gln Val Asp Met Ala Gly Asp Ser Gly Val Val Thr Gly Met
 130 135 140
 Ala Pro Ser Ala Glu Ala His Arg Gly Ala Ala Glu Ala Ala Ala Ala
 145 150 155 160
 Ala Ala Gly Gly Asn Asp Lys Val Val Asp Met Ser Gln Ile Asn Thr
 165 170 175
 Ser Gly Val Val Gln Val Glu Val Lys Val Val Glu Leu Ala Arg Ser
 180 185 190
 Val Met Lys Asp Val Gly Ile Asn Phe Arg Ala Asp Ser Gly Pro Trp

	195					200				205					
Ser	Gly	Val	Ser	Leu	Leu	Pro	Asp	Leu	Ala	Ser	Gly	Gly	Met	Phe	
	210					215				220					
Gly	Met	Leu	Ser	Tyr	Thr	Ser	Arg	Asp	Phe	Ser	Ala	Ser	Leu	Ala	Leu
225					230				235						240
Leu	Gln	Asn	Asn	Gly	Met	Ala	Arg	Val	Leu	Ala	Glu	Pro	Thr	Leu	Leu
				245					250						255
Ala	Met	Ser	Gly	Gln	Ser	Ala	Ser	Phe	Leu	Ala	Gly	Gly	Glu	Ile	Pro
			260					265							270
Ile	Pro	Val	Ser	Ala	Gly	Leu	Gly	Thr	Thr	Ser	Val	Gln	Phe	Lys	Pro
			275					280							285
Phe	Gly	Ile	Gly	Leu	Thr	Val	Thr	Pro	Thr	Val	Ile	Ser	Arg	Glu	Arg
	290					295					300				
Ile	Ala	Leu	Lys	Val	Ala	Pro	Glu	Ala	Ser	Glu	Leu	Asp	Tyr	Ala	Asn
305					310					315					320
Gly	Ile	Ser	Ser	Ile	Asp	Ser	Asn	Asn	Arg	Ile	Thr	Val	Ile	Pro	Ala
				325					330						335
Leu	Arg	Thr	Arg	Lys	Ala	Asp	Thr	Met	Val	Glu	Leu	Gly	Asp	Gly	Glu
			340					345							350
Thr	Phe	Val	Ile	Ser	Gly	Leu	Val	Ser	Arg	Gln	Thr	Lys	Ala	Ser	Val
			355					360							365
Asn	Lys	Val	Pro	Leu	Leu	Gly	Asp	Leu	Pro	Ile	Ile	Gly	Ala	Phe	Phe
	370					375					380				
Arg	Asn	Val	Gln	Tyr	Ser	Gln	Glu	Asp	Arg	Glu	Leu	Val	Ile	Val	Val
385					390					395					400
Thr	Pro	Arg	Leu	Val	Arg	Pro	Ile	Ala	Arg	Gly	Val	Thr	Leu	Pro	Leu
				405					410						415
Pro	Gly	Ala	Arg	Gln	Glu	Val	Ser	Asp	Ala	Gly	Phe	Asn	Ala	Trp	Gly
				420				425							430
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Gln															

<210> 69
 <211> 1290
 <212> DNA
 <213> Bordetella pertussis
 <400> 69

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cagcgcttg cctggaccga gctgccaac tgggagagcg acgacctgtc gcgctggtgg 240
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tacctgtcga ccacgctgcc ggcctccgac cggccctgc agcgaccgt gttcgcgcag 1140

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gacaccggca cggccattcg cggcgcgggcg cgcgccgact tctattgggg ctacggcgag 1200
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<210> 70

<211> 429

<212> PRT

<213> Bordetella pertussis

<400> 70

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			20					25					30				
Pro	Pro	Ala	Ala	Glu	Gly	Pro	Leu	Val	Val	Pro	Pro	Leu	Ser	Ala	Leu		
		35					40					45					
Ser	Asp	Thr	Pro	Pro	Arg	Ala	Leu	Ala	Gly	Arg	Tyr	Gln	Arg	Val	Ala		
	50					55					60						
Trp	Thr	Glu	Leu	Pro	Asn	Trp	Glu	Ser	Asp	Asp	Leu	Ser	Arg	Trp	Trp		
65					70					75					80		
Pro	Leu	Phe	Leu	Arg	Asn	Cys	Lys	Gly	Leu	Met	Arg	Pro	Thr	Ser	Gly		
			85						90					95			
Asn	Leu	Ala	Ala	Pro	Ala	Arg	Ala	Thr	Pro	Arg	Ala	Trp	Gln	Pro	Val		
			100					105					110				
Cys	Ala	Ala	Ala	Val	Asp	Pro	Ser	Lys	Ala	Pro	Ala	Ala	Gly	Asp	Ser		
	115						120					125					
Ala	Ala	Val	Arg	Arg	Phe	Leu	Gln	Thr	Trp	Leu	Gln	Pro	Trp	Arg	Ile		
	130					135					140						
Ala	Gly	Ala	Asp	Gly	Arg	Pro	Ala	Thr	Asn	Thr	Val	Thr	Gly	Tyr	Tyr		
145					150					155					160		
Glu	Pro	Leu	Val	Arg	Gly	Ser	Arg	Arg	Gln	Gly	Gly	Arg	Tyr	Gln	Trp		
			165						170					175			
Pro	Leu	Tyr	Ala	Val	Pro	Ala	Asp	Leu	Leu	Val	Val	Asp	Leu	Gly	Ser		
			180					185					190				
Val	Tyr	Pro	Asp	Leu	Thr	Gly	Lys	Arg	Val	Arg	Gly	Arg	Leu	Asp	Gly		
	195						200					205					
Arg	Arg	Val	Val	Pro	Tyr	Asp	Thr	Arg	Ala	Ala	Ile	Glu	Ala	Gly	Asp		
	210					215					220						
Arg	Lys	Pro	Pro	Ala	Ile	Val	Trp	Val	Asp	Asp	Pro	Val	Asp	Asn	Phe		
225					230					235					240		
Phe	Leu	Gln	Val	Gln	Gly	Ser	Gly	Arg	Val	Gln	Leu	Thr	Asp	Gly	Pro		
			245						250					255			
Asp	Arg	Gly	Thr	Thr	Ile	Arg	Val	Ala	Tyr	Ala	Asp	His	Asn	Gly	Gln		
			260					265					270				
Pro	Tyr	Ala	Ser	Ile	Gly	Arg	Trp	Leu	Ile	Asp	Lys	Gly	Glu	Leu	Arg		
	275						280					285					
Ala	Asp	Gln	Ala	Ser	Met	Gln	Asn	Ile	Arg	Ala	Trp	Ala	Gln	Arg	Asn		
	290					295					300						
Pro	Ser	Arg	Val	Gln	Glu	Met	Leu	Asn	Ala	Asn	Pro	Ala	Val	Val	Phe		
305					310					315					320		
Phe	Arg	Glu	Glu	Ala	Val	Val	Asp	Pro	Glu	Gln	Gly	Pro	Lys	Gly	Ala		
			325						330					335			
Tyr	Gly	Ile	Pro	Leu	Ala	Pro	Gln	Arg	Ser	Ile	Ala	Val	Asp	Ala	Gly		
			340					345					350				
Phe	Val	Pro	Leu	Gly	Thr	Pro	Val	Tyr	Leu	Ser	Thr	Thr	Leu	Pro	Ala		
	355						360					365					
Ser	Asp	Arg	Pro	Leu	Gln	Arg	Thr	Val	Phe	Ala	Gln	Asp	Thr	Gly	Thr		
	370					375					380						
Ala	Ile	Arg	Gly	Ala	Ala	Arg	Ala	Asp	Phe	Tyr	Trp	Gly	Tyr	Gly	Glu		
385					390					395					400		
Glu	Ala	Gly	Gln	Gln	Ala	Gly	Arg	Met	Lys	Gln	Arg	Gly	Gln	Met	Trp		

405
 Leu Leu Trp Pro Lys Gln Ala Gly Glu Pro Ser Ala Arg
 420 425

415

<210> 71
 <211> 1146
 <212> DNA
 <213> Bordetella pertussis

<400> 71
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 gccgaccgcg tccgcatcgg cccggacaaa cccgtatcga gcgacgaagg ccccgccacg 180
 ctgacgccga cggcggaact gcggcccgac gtccgcgcct tcgccgaaca gctggcgggc 240
 cagcgcgagc tgcccctgcc gcaagtgtg gccagcctgg aaagcacgcg ctacaacgcg 300
 accgtcgccc gcctcatcgc cccgtccggc gcgtcgggca agaaaatctg gcgcagctgg 360
 ctgacctatc gcgggctgtt cgtcgaaccc aagcgcacgc cctggggcgt ggaattcttg 420
 aacgccaacc aggacctgct caaccgcgcc gccagcgct acggcggtgc ggcctcgatc 480
 atcgctcca tcacggcgt ggaacccctg tatggccgca acgtgggcaa cttccgcgtg 540
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 agctacttct atgccacggc ggtggccgac ctggcggcgc aactgcaggc ccgcacgggc 1140
 tattga 1146

<210> 72
 <211> 381
 <212> PRT
 <213> Bordetella pertussis

<400> 72
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 Pro Ala Gln Ala Ala Thr Gly Gln Ala Asp Arg Val Arg Ile Gly Pro
 35 40 45
 Asp Lys Pro Val Ser Ser Asp Glu Gly Pro Ala Thr Leu Thr Pro Thr
 50 55 60
 Gly Glu Leu Arg Pro Asp Val Arg Ala Phe Ala Glu Gln Leu Ala Ala
 65 70 75 80
 Gln Arg Glu Leu Pro Leu Pro Gln Val Leu Ala Ser Leu Glu Ser Thr
 85 90 95
 Arg Tyr Asn Ala Thr Val Ala Arg Leu Ile Ala Pro Ser Gly Ala Ser
 100 105 110
 Gly Lys Lys Ile Trp Arg Ser Trp Leu Thr Tyr Arg Gly Arg Phe Val
 115 120 125
 Glu Pro Lys Arg Ile Ala Trp Gly Val Glu Phe Trp Asn Ala Asn Gln
 130 135 140
 Asp Leu Leu Asn Arg Ala Ala Gln Arg Tyr Gly Val Pro Ala Ser Ile
 145 150 155 160
 Ile Ala Ser Ile Ile Gly Val Glu Thr Leu Tyr Gly Arg Asn Val Gly
 165 170 175

Asn	Phe	Arg	Val	Val	Asp	Ala	Leu	Ala	Thr	Leu	Ala	Phe	Asp	Tyr	Leu
			180					185					190		
Asp	Pro	Ala	Lys	Pro	Glu	Arg	Ala	Asp	Met	Phe	Arg	Gly	Gln	Leu	Gly
		195					200					205			
Asp	Phe	Ile	Thr	Leu	Ala	Leu	Gln	Asp	Lys	Leu	Asp	Pro	Glu	Thr	Arg
	210					215					220				
Gly	Ser	Tyr	Ala	Gly	Ala	Ile	Gly	Met	Pro	Gln	Phe	Met	Pro	Gly	Ser
225					230					235					240
Ile	Met	Arg	Tyr	Ala	Val	Asp	Gly	Asp	Asp	Asp	Gly	His	Ile	Asp	Leu
				245				250						255	
Thr	Asn	Ser	Val	Ala	Asp	Ala	Val	Met	Ser	Val	Gly	Asn	Phe	Leu	Val
			260					265					270		
Glu	His	Gly	Trp	Gln	Arg	Gly	Leu	Pro	Val	Phe	Ala	Pro	Val	Ala	Leu
		275					280					285			
Pro	Ala	Asp	Pro	Ala	Pro	Leu	Val	Ala	Gly	Gly	Leu	Thr	Pro	Thr	Leu
	290					295					300				
Asp	Trp	Asn	Gly	Leu	Gln	Ala	Ala	Gly	Ala	Arg	Pro	Ala	Ala	Gly	Ala
305					310					315					320
Gly	Arg	Gly	Ala	Trp	Gln	Glu	His	Pro	Met	Gly	Ile	Val	Asp	Leu	Val
				325					330					335	
Glu	Glu	Ala	Arg	Gly	Thr	Val	Gln	Tyr	Arg	Thr	Ala	Thr	Pro	Asn	Phe
			340					345					350		
Phe	Ala	Leu	Thr	Gln	Tyr	Asn	Arg	Ser	Tyr	Phe	Tyr	Ala	Thr	Ala	Val
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Ala	Asp	Leu	Ala	Ala	Glu	Leu	Gln	Ala	Arg	Thr	Gly	Tyr			
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<210> 73

<211> 1098

<212> DNA

<213> Bordetella pertussis

<400> 73

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ccctatgtgc	tggtcaaggc	ggtgtccaag	gatggcgcca	cctcggacgg	ctacgtgggc	240
aatatgcgcg	tgatgccggg	cgatgtgctg	cgcatcctgg	tagccgacag	catggagacc	300
ggactgttcg	cgccgctggc	cgccggcggc	acggtgttcg	aagccgtgcg	ggtcgcggcc	360
gacggcagca	tctcgtgcc	ctatgcgggc	cgctgaaag	tgcagggcaa	gtcgtggcg	420
cagatcgagc	agctcgtcaa	gggcagcctg	cgcaataccg	cggcggtgca	gccgcaggcc	480
atggtggatc	tggccgacga	ccgctccaat	tcggtgctgg	tggccggggc	ggtgccgcgc	540
ccgggacgct	tcggcggcaa	caagggcccg	ctgacggcgc	tggatgcgat	cacgcaggcg	600
ggcggtcga	ccctgccggc	ttaccaggcc	gacgtagtga	tccggactgg	cagcaagggtg	660
cagcgcattc	cttaccagca	attgctcaac	ggccgcaacg	tggcgggtga	gccgcgctcc	720
gaactgggtg	tcgaaccgaa	cctgaagcgt	ttcgtggcga	tgggggccct	taccaagccg	780
ggcctgcacg	aactgccgtc	gaaccagacc	aatctgctcg	acgccctggg	cgtggccgga	840
ggcctgaacg	accgcgcggc	cgacgccacc	ggggtattcg	tttttcgcct	ggacggccgc	900
aacgccgatg	gccgcccgcg	gcccacgggtg	ttcaggctga	atatgcgcaa	tccggagtcc	960
atgttcctgg	ccaagcaatt	cgagctgctg	cgggaggacg	tggtgtatgt	cagtaatgcg	1020
cccatgtacg	aatgggaaaa	gatcattacg	cctatcgtgc	aggtcctgat	cgtgggccaa	1080
cgcgtaggta	cttactaa					1098

<210> 74

<211> 365

<212> PRT

<213> Bordetella pertussis

<400> 74

Met Asn His Arg Leu Ile Arg Cys Leu Ser Ile Ala Leu Leu Ala Leu

1				5				10					15				
Leu	Ser	Gly	Cys	Ser	Ile	Leu	Ser	Gly	Ser	Gly	Pro	Thr	Arg	Ser	Ala		
			20					25					30				
Ile	Met	Asp	Gly	Gly	Ser	Thr	Asp	Ala	Thr	Gly	Ala	Lys	Leu	Gly	Ser		
		35					40					45					
Tyr	Asp	Leu	Val	Asp	Leu	Arg	Ala	Asp	Thr	Ile	Ala	Pro	Tyr	Val	Leu		
	50					55					60						
Val	Lys	Ala	Val	Ser	Lys	Asp	Gly	Ala	Thr	Ser	Asp	Gly	Tyr	Val	Gly		
65				70						75					80		
Asn	Met	Arg	Val	Met	Pro	Gly	Asp	Val	Leu	Arg	Ile	Leu	Val	Ala	Asp		
				85					90					95			
Ser	Met	Glu	Thr	Gly	Leu	Phe	Ala	Pro	Leu	Ala	Ala	Gly	Gly	Thr	Val		
			100					105					110				
Phe	Glu	Ala	Val	Arg	Val	Ala	Ala	Asp	Gly	Ser	Ile	Ser	Leu	Pro	Tyr		
	115					120						125					
Ala	Gly	Arg	Leu	Lys	Val	Gln	Gly	Lys	Ser	Leu	Ala	Gln	Ile	Glu	Gln		
	130					135					140						
Leu	Val	Lys	Gly	Ser	Leu	Arg	Asn	Thr	Ala	Ala	Val	Gln	Pro	Gln	Ala		
145				150						155					160		
Met	Val	Asp	Leu	Ala	Asp	Asp	Arg	Ser	Asn	Ser	Val	Leu	Val	Ala	Gly		
			165					170						175			
Ala	Val	Pro	Arg	Pro	Gly	Arg	Phe	Gly	Gly	Asn	Lys	Gly	Pro	Leu	Thr		
		180					185					190					
Ala	Leu	Asp	Ala	Ile	Thr	Gln	Ala	Gly	Gly	Ser	Thr	Leu	Pro	Ala	Tyr		
	195					200						205					
Gln	Ala	Asp	Val	Val	Ile	Arg	Thr	Gly	Ser	Lys	Val	Gln	Arg	Ile	Pro		
	210				215						220						
Tyr	Gln	Gln	Leu	Leu	Asn	Gly	Arg	Asn	Val	Ala	Val	Glu	Pro	Arg	Ser		
225				230					235					240			
Glu	Leu	Val	Val	Glu	Pro	Asn	Leu	Lys	Arg	Phe	Val	Ala	Met	Gly	Ala		
			245					250						255			
Leu	Thr	Lys	Pro	Gly	Leu	His	Glu	Leu	Pro	Ser	Asn	Gln	Thr	Asn	Leu		
		260					265					270					
Leu	Asp	Ala	Leu	Gly	Val	Ala	Gly	Gly	Leu	Asn	Asp	Arg	Ala	Ala	Asp		
	275					280					285						
Ala	Thr	Gly	Val	Phe	Val	Phe	Arg	Leu	Asp	Gly	Arg	Asn	Ala	Asp	Gly		
	290				295						300						
Arg	Pro	Arg	Pro	Thr	Val	Phe	Arg	Leu	Asn	Met	Arg	Asn	Pro	Glu	Ser		
305				310					315					320			
Met	Phe	Leu	Ala	Lys	Gln	Phe	Glu	Leu	Leu	Pro	Glu	Asp	Val	Val	Tyr		
			325					330						335			
Val	Ser	Asn	Ala	Pro	Met	Tyr	Glu	Trp	Glu	Lys	Ile	Ile	Thr	Pro	Ile		
		340					345					350					
Val	Gln	Val	Leu	Ile	Val	Gly	Gln	Arg	Val	Gly	Thr	Tyr					
	355					360						365					

<210> 75

<211> 900

<212> DNA

<213> Bordetella pertussis

<400> 75

atgcaacgtc	tcattgccccat	cctgggtcggg	ctgctcgtcg	tccctggccgt	cctgtctttca	60
tgcgtcttcg	tggtccgcga	gcgcgactac	gccctgggtgt	tctcgtggg	cgagggtgcgc	120
caggtcatca	gcgagcctgg	cctgtatttc	aaggcgccgc	cgccgttcca	gaacgtcgtc	180
acgctggaca	agcgatccct	caccatcgag	tccagcgatg	ccgagcgcat	ccagacctcc	240
gagaagaaga	acctgctgat	cgactcgtac	gtcaagtggc	gcatcgccga	tccgcgcctg	300
tactacgtga	ccttggcgcg	caacgagcgc	gccgcccagg	agcgtctgca	ggcgagatc	360
cgcgacgcgc	tgaacgcggc	ggtcaacgtg	cgcacgggtca	aggacgtggg	ctcggccgag	420
cgtgacaagg	tcattggccga	aatcctcacc	aacgtcgtca	agcgcgccga	gccgctgggc	480

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gtgcaggtgg tcgacgtgcg cctgcgccgc atcgagttcg cgcccagatg ttccgagtcg 540
gtctatcgcc gcatggaagc cgagcgcacc cgcgtggcca acgagctgcg ttcgatcggc 600
gcggccgaaa gcgagaagat ccgcgccgag gccgaccgcc agcgcgaggt catcgaggcc 660
caggcctatg cgcgcgcccc gggcatcatg ggcgagggcg acgcccaggc cggcagcatc 720
tacgcccagg ccttcggccg caataccgag ttctacacct attacaagag cctggaagcc 780
tatcgcgccg cgttcggcaa aaccggtgac gtattggtgg tcgatccgac gtcggagttc 840
ttccagttct tcaagaacct cggcaagggc gcggcgggcg ccccggcacc ggcgaattga 900

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<210> 76

<211> 299

<212> PRT

<213> Bordetella pertussis

<400> 76

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Met Gln Arg Leu Met Pro Ile Leu Val Gly Leu Leu Val Val Leu Ala
1      5      10      15
Val Leu Ser Ser Cys Val Phe Val Val Arg Glu Arg Asp Tyr Ala Leu
20     25     30
Val Phe Ser Leu Gly Glu Val Arg Gln Val Ile Ser Glu Pro Gly Leu
35     40     45
Tyr Phe Lys Ala Pro Pro Pro Phe Gln Asn Val Val Thr Leu Asp Lys
50     55     60
Arg Ile Leu Thr Ile Glu Ser Ser Asp Ala Glu Arg Ile Gln Thr Ser
65     70     75     80
Glu Lys Lys Asn Leu Leu Ile Asp Ser Tyr Val Lys Trp Arg Ile Ala
85     90     95
Asp Pro Arg Leu Tyr Tyr Val Thr Phe Gly Gly Asn Glu Arg Ala Ala
100    105    110
Gln Glu Arg Leu Gln Ala Gln Ile Arg Asp Ala Leu Asn Ala Ala Val
115    120    125
Asn Val Arg Thr Val Lys Asp Val Val Ser Ala Glu Arg Asp Lys Val
130    135    140
Met Ala Glu Ile Leu Thr Asn Val Val Lys Arg Ala Glu Pro Leu Gly
145    150    155    160
Val Gln Val Val Asp Val Arg Leu Arg Arg Ile Glu Phe Ala Pro Glu
165    170    175
Ile Ser Glu Ser Val Tyr Arg Arg Met Glu Ala Glu Arg Thr Arg Val
180    185    190
Ala Asn Glu Leu Arg Ser Ile Gly Ala Ala Glu Ser Glu Lys Ile Arg
195    200    205
Ala Glu Ala Asp Arg Gln Arg Glu Val Ile Val Ala Gln Ala Tyr Ala
210    215    220
Arg Ala Gln Gly Ile Met Gly Glu Gly Asp Ala Gln Ala Gly Ser Ile
225    230    235    240
Tyr Ala Gln Ala Phe Gly Arg Asn Thr Glu Phe Tyr Thr Tyr Tyr Lys
245    250    255
Ser Leu Glu Ala Tyr Arg Ala Ala Phe Gly Lys Thr Gly Asp Val Leu
260    265    270
Val Val Asp Pro Thr Ser Glu Phe Phe Gln Phe Phe Lys Asn Pro Gly
275    280    285
Lys Gly Ala Ala Gly Ala Pro Ala Pro Ala Asn
290    295

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<210> 77

<211> 855

<212> DNA

<213> Bordetella pertussis

<400> 77

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ttgcccaggg aggcaaccat gaaacccgtc atccagactt tccctgcgcgc cgccgcgctg 60
gccggcctgg cgctgctggc cggtgcgcgc ggcgtcagca cgacgcagtc cggcgcgatac 120
ggcgtggacc gcaccaata catgtcgagc ctggtgcccg agcaggcgct ggtgcaggag 180
gccgggcagc agtatgccga gatcgctccag gaggcccgcg ccaaggggct gcttgaccgc 240
gacccggcgc aattgtcgcg cgtgcgcgcc atttcccagc gcctgatcgc gcagaccggg 300
gtgttttcgcg ccgacgcggc caactggcca tgggaagtgc atgtgctgtc ggtcgacgag 360
gtcaacgcct ggtgcatgcc cggcggcaag attgccgtct acacgggcct gctcgccccat 420
atcaagccga ccgacgacga actggcggcg gtgctggggc acgagatcgc gcatgcgttg 480
cgcgagcacg cgcgcgagcg cgtctcgagc cagatggcga ccagcatcgg cctgtcggtg 540
ctgtccatgg ccaccgggttc gcccggcgcg tccgacctgg gcggcaagct gaccgaagtc 600
atgttcacct tgcccaacag ccgcacgcac gagaccgagg ccgacgcgat gggcgctcgaa 660
ctggccgcgc gcgccggttt cgatccgcgc gccgccgtca cgctgtggca gaaaatgggc 720
gcggccgacg gcaatgcgcc gccggagttc ctgtccacc acccgtcggc cagtaccgcg 780
atcggcgaat tgcagcaggc cttgcagaag gtattgccgc tgtacgagca ggcgcgcggc 840
caggccgcca aatag 855

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<210> 78

<211> 284

<212> PRT

<213> Bordetella pertussis

<400> 78

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Leu Pro Arg Glu Ala Thr Met Lys Pro Val Ile Gln Thr Phe Leu Arg
 1          5          10          15
Ala Ala Ala Val Ala Gly Leu Ala Leu Leu Ala Gly Cys Ala Gly Val
          20          25          30
Ser Thr Thr Gln Ser Gly Ala Ile Gly Val Asp Arg Thr Gln Tyr Met
          35          40          45
Ser Ser Leu Val Pro Glu Gln Ala Leu Val Gln Glu Ala Gly Gln Gln
          50          55          60
Tyr Ala Glu Ile Val Gln Glu Ala Arg Ala Lys Gly Leu Leu Asp Arg
65          70          75          80
Asp Pro Ala Gln Leu Ser Arg Val Arg Ala Ile Ser Gln Arg Leu Ile
          85          90          95
Ala Gln Thr Gly Val Phe Arg Ala Asp Ala Ala Asn Trp Pro Trp Glu
          100          105          110
Val His Val Leu Ser Val Asp Glu Val Asn Ala Trp Cys Met Pro Gly
          115          120          125
Gly Lys Ile Ala Val Tyr Thr Gly Leu Leu Ala His Ile Lys Pro Thr
          130          135          140
Asp Asp Glu Leu Ala Ala Val Leu Gly His Glu Ile Ala His Ala Leu
145          150          155          160
Arg Glu His Ala Arg Glu Arg Val Ser Gln Gln Met Ala Thr Ser Ile
          165          170          175
Gly Leu Ser Val Leu Ser Met Ala Thr Gly Ser Pro Gly Ala Ser Asp
          180          185          190
Leu Gly Gly Lys Leu Thr Glu Val Met Phe Thr Leu Pro Asn Ser Arg
          195          200          205
Thr His Glu Thr Glu Ala Asp Arg Met Gly Val Glu Leu Ala Ala Arg
210          215          220
Ala Gly Phe Asp Pro Arg Ala Ala Val Thr Leu Trp Gln Lys Met Gly
225          230          235          240
Ala Ala Asp Gly Asn Ala Pro Pro Glu Phe Leu Ser Thr His Pro Ser
          245          250          255
Ala Ser Thr Arg Ile Gly Glu Leu Gln Gln Ala Leu Gln Lys Val Leu
260          265          270
Pro Leu Tyr Glu Gln Ala Arg Gly Gln Ala Ala Lys
275          280

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<210> 79
 <211> 849
 <212> DNA
 <213> Bordetella pertussis

<400> 79
 gtgactcacc gtcccgtctgc actctcgaag cccgcctccc gccgcgggggt ggccctgcgc 60
 gcggcgatcg cgctgtcaac cattctgacg gtggccggct gcggctcgtc aagcaccaaa 120
 tacgacaaga ccgcggggctg gagcgccgaa cagttgtacg ccgacgcaa gcaggaagtc 180
 gcggcggggca actggaccga tggccgggag cgctgaccg ccacgaaaag ccgctaccgc 240
 ttccggcacgt acgcccagca ggccctgacg gaactggctt acgtcaactg gaaagacggc 300
 gagaacgaac aggcgctggc cgccatcgac cgcttccagc agctctatcc caaccaccgc 360
 ggcacggact acgtgctgta cctgaagggg ctggtcaact tcacgccggc cagcgccttc 420
 atgagcaacc tgaccggcca ggaccccgcc gagcgcgac ccaagggcct gcgcgcgtcc 480
 tacgatgcgt tcaacgaact ggtccagcgc ttccccaaca gcaagtacac gcccgatgcg 540
 cagaagcgca tgacctggct ggtcaacgcc atcgccatga acgaagtcca cgtggcgcgc 600
 tactactacg agcggggcgc ctacgtggcg gccgccaacc gggcgagac cgtgatcacc 660
 gatttcgagg gggcccccgc ctcggaagaa gcgctctata tcatggctga gtcgtatgac 720
 aagctgggaa tgaccgaact gaagggcgac gccgaacgcg tgctcgacca gaactatccc 780
 aacagcaaat tcaagacgca aggcctgtcg gccgacaaga gctgggtggaa cccgttctcg 840
 tggcgctga 849

<210> 80
 <211> 282
 <212> PRT
 <213> Bordetella pertussis

<400> 80
 Val Thr His Arg Pro Ala Ala Leu Ser Lys Pro Ala Ser Arg Arg Gly
 1 5 10 15
 Val Ala Leu Arg Ala Ala Ile Ala Leu Ser Thr Ile Leu Ile Val Ala
 20 25 30
 Gly Cys Gly Ser Ser Ser Thr Lys Tyr Asp Lys Thr Ala Gly Trp Ser
 35 40 45
 Ala Glu Gln Leu Tyr Ala Asp Ala Lys Gln Glu Val Ala Ala Gly Asn
 50 55 60
 Trp Thr Asp Ala Arg Glu Arg Leu Thr Ala Ile Glu Ser Arg Tyr Pro
 65 70 75 80
 Phe Gly Thr Tyr Ala Gln Gln Ala Leu Ile Glu Leu Ala Tyr Val Asn
 85 90 95
 Trp Lys Asp Gly Glu Asn Glu Gln Ala Leu Ala Ala Ile Asp Arg Phe
 100 105 110
 Gln Gln Leu Tyr Pro Asn His Pro Gly Thr Asp Tyr Val Leu Tyr Leu
 115 120 125
 Lys Gly Leu Val Asn Phe Thr Pro Ala Ser Ala Phe Met Ser Asn Leu
 130 135 140
 Thr Gly Gln Asp Pro Ala Glu Arg Asp Pro Lys Gly Leu Arg Ala Ser
 145 150 155 160
 Tyr Asp Ala Phe Asn Glu Leu Val Gln Arg Phe Pro Asn Ser Lys Tyr
 165 170 175
 Thr Pro Asp Ala Gln Lys Arg Met Thr Trp Leu Val Asn Ala Ile Ala
 180 185 190
 Met Asn Glu Val His Val Ala Arg Tyr Tyr Tyr Glu Arg Gly Ala Tyr
 195 200 205
 Val Ala Ala Ala Asn Arg Ala Gln Thr Val Ile Thr Asp Phe Glu Gly
 210 215 220
 Ala Pro Ala Ser Glu Glu Ala Leu Tyr Ile Met Val Glu Ser Tyr Asp
 225 230 235 240
 Lys Leu Gly Met Thr Glu Leu Lys Gly Asp Ala Glu Arg Val Leu Asp
 245 250 255
 Gln Asn Tyr Pro Asn Ser Lys Phe Lys Thr Gln Gly Leu Ser Ala Asp

260
 Lys Ser Trp Trp Asn Pro Phe Ser Trp Arg
 275 280

270

<210> 81
 <211> 816
 <212> DNA
 <213> Bordetella pertussis

<400> 81
 ttgccccac aggttgacct tgccatgacg aagcactctg ccgctcgaat cgccaccatc 60
 gccgccgcag gcgtcctgct ggccggctgc gcagcgccca agaacccga tccgcgcgat 120
 ccctgggaag gcttcaaccg gggcgctctac aagttcaacg acacggtcga ccgcgcgctg 180
 ttcaagccgg tggcccaggc ctataccttc gtcacccgcg agccggtgcg cagctgcgtg 240
 cacaatatgt tcagcaacgt gggcgacctg tggtcggcca ccaacagctt cctgcaaggc 300
 cgcgggcacg atttcgtcaa cacgatcggc cgcttcctgt tcaataccac catggggatc 360
 ggcggctgct tcgacgtcgc gtcgaccacc ggggcgcgca agatcccca cgacttcggc 420
 gtgacgtggt gcgtctgggg cttcggccag ggaccgtacc tgggtgctgcc gatctggggc 480
 gccagcagcc tgcgcgacgg cgtcggcctg atcggcgact ggaccggcaa ccagggcgcg 540
 accatggcgg cgatcgacaa cgtgcgcgtg cgcaactcgc tgtggggcct ggaggccgtc 600
 gacctgcgcg ccagcctgct cgataccacc gacaccgtgg accgcgtggc gctggatccc 660
 tacagcttcg tgcgcgacgc ctacctgcag cgccgcgcgg ccatggtgcg cggcaccaag 720
 acgggcgacg acacgctgcc cacctatgaa gacgagggcg atgacgacgc ggccccgcgc 780
 gcgccggccg cccagccggc cgcccagccg cagtaa 816

<210> 82
 <211> 271
 <212> PRT
 <213> Bordetella pertussis

<400> 82
 Leu Pro Pro Gln Val Asp Leu Ala Met Thr Lys His Ser Ala Ala Arg
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 Ile Ala Thr Ile Ala Ala Ala Gly Val Leu Leu Ala Gly Cys Ala Ala
 20 25 30
 Pro Lys Asn Pro Asp Pro Arg Asp Pro Trp Glu Gly Phe Asn Arg Gly
 35 40 45
 Val Tyr Lys Phe Asn Asp Thr Val Asp Arg Ala Leu Phe Lys Pro Val
 50 55 60
 Ala Gln Ala Tyr Thr Phe Val Thr Pro Gln Pro Val Arg Ser Cys Val
 65 70 75 80
 His Asn Met Phe Ser Asn Val Gly Asp Leu Trp Ser Ala Thr Asn Ser
 85 90 95
 Phe Leu Gln Gly Arg Gly His Asp Phe Val Asn Thr Ile Gly Arg Phe
 100 105 110
 Leu Phe Asn Thr Thr Met Gly Ile Gly Gly Cys Phe Asp Val Ala Ser
 115 120 125
 Thr Thr Gly Ala Arg Lys Ile Pro Asn Asp Phe Gly Val Thr Leu Gly
 130 135 140
 Val Trp Gly Phe Gly Gln Gly Pro Tyr Leu Val Leu Pro Ile Trp Gly
 145 150 155 160
 Ala Ser Ser Leu Arg Asp Gly Val Gly Leu Ile Gly Asp Trp Thr Gly
 165 170 175
 Asn Gln Gly Ala Thr Ile Gly Ala Ile Asp Asn Val Pro Leu Arg Asn
 180 185 190
 Ser Leu Trp Gly Leu Glu Ala Val Asp Leu Arg Ala Ser Leu Leu Asp
 195 200 205
 Thr Thr Asp Thr Val Asp Arg Val Ala Leu Asp Pro Tyr Ser Phe Val
 210 215 220
 Arg Asp Ala Tyr Leu Gln Arg Arg Ala Ala Met Val Arg Gly Thr Lys

225		230		235		240
Thr Gly Asp Asp Thr Leu Pro Thr Tyr Glu Asp Glu Gly Asp Asp Asp						
	245		250		255	
Ala Ala Pro Ala Ala Pro Ala Ala Gln Pro Ala Ala Gln Pro Gln						
	260		265		270	

<210> 83
 <211> 804
 <212> DNA
 <213> Bordetella pertussis

<400> 83
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 atgcgtagtg ggcgcgcatg ggtgctggaa gggaggttta tgcggtttgg atggggattg 120
 ccggcgctgg ccgtcgtgct tgcgctggcc ggatgcgtga atcgcgagcc agaggagcgc 180
 gcgcccttca tcgcttatct ggaacaagt ggcgcgcccgc aggcggggcgt cgtggccgcg 240
 ccgcccgcacc cgcccacgcg caaggccctg ggcgactacg aggcgcagta cgagccgatg 300
 gaagcggcgc acgcccgcgt ggcggaagcg ttggcggcgc agcaggcggc gctgcaggcg 360
 ctgcggtgctg attcggtcga cgagatcgct gcacgccagg acggctggga caggctggcc 420
 gagcgccctgg cggccgcgcg caccgggctc gaacaggcgc gcgcgcgcgc cgacgccgcg 480
 cgcgccggga tggagcagcc tcccgcactg cgcaacgcct acgcgcgcgc ctatgaacac 540
 agcgtcacgg cgccggcaca ggccttggcg cggatatccg gcctgctcga acccgccgtg 600
 gaggatgcgc ggcgcgtggc cgggttcgtt gcgcgccatc gcgatcaggc cgataccgat 660
 ggtccgctga cccaggtgcg cgatccctcg gtgcgcagcg agctcaatgt actgctgcag 720
 gcgctcaatg gccgctccga ccagggttctg caggcgcagg ccttgctcaa tggcctggcg 780
 ggaccggctc gccaggcgcc ctga 804

<210> 84
 <211> 267
 <212> PRT
 <213> Bordetella pertussis

<400> 84
 Met Ala Thr Lys Cys Leu Leu Gln Gly Ser Phe Pro Asp Ala Ser Pro
 1 5 10 15
 Ile Met Pro Ala Met Arg Ser Gly Ala Ala Trp Val Leu Glu Gly Arg
 20 25 30
 Phe Met Arg Phe Gly Trp Gly Leu Pro Ala Leu Ala Val Val Leu Ala
 35 40 45
 Leu Ala Gly Cys Val Asn Arg Glu Pro Glu Glu Arg Ala Ala Phe Ile
 50 55 60
 Ala Tyr Leu Glu Gln Val Ala Ala Pro Gln Ala Gly Val Val Ala Ala
 65 70 75 80
 Pro Pro Asp Pro Pro Thr Arg Lys Ala Leu Gly Asp Tyr Glu Ala Gln
 85 90 95
 Tyr Glu Pro Met Glu Ala Ala His Ala Ala Val Arg Glu Ala Leu Ala
 100 105 110
 Ala Gln Gln Ala Ala Leu Gln Ala Leu Arg Leu His Ser Val Asp Glu
 115 120 125
 Ile Val Ala Arg Gln Asp Gly Trp Asp Arg Leu Ala Glu Arg Leu Ala
 130 135 140
 Ala Ala Arg Thr Gly Leu Glu Gln Ala Arg Ala Ala Asp Ala Ala
 145 150 155 160
 Arg Ala Gly Met Glu Gln Pro Pro Asp Leu Arg Asn Ala Tyr Ala Arg
 165 170 175
 Ala Tyr Glu His Ser Val Thr Ala Pro Ala Gln Ala Leu Ala Arg Ile
 180 185 190
 Ser Gly Leu Leu Glu Pro Ala Val Glu Asp Ala Arg Arg Val Ala Gly
 195 200 205
 Phe Val Ala Arg His Arg Asp Gln Val Asp Thr Asp Gly Pro Leu Thr

210	215	220
Gln Val Arg Asp Pro Ser Val Arg Ser Glu Leu Asn Val Leu Leu Gln		
225	230	235
Ala Leu Asn Gly Arg Ser Asp Gln Val Ser Gln Ala Gln Ala Leu Leu		240
	245	250
Asn Gly Leu Ala Gly Pro Ala Arg Gln Ala Pro		255
260	265	

<210> 85
 <211> 693
 <212> DNA
 <213> Bordetella pertussis

<400> 85
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 ggctgcccga tgattccgcc cgaaccggtg gtgatctgtc cgctgaccgc gccgcctccg 120
 tcgcccgcgc aaccctcggc gcggcccaac ggctcgatct accagccttc ggctacggc 180
 aactatccgc tggttcgagga ccgcccggcg cgcaacgtgg gcgacatcgt caccatcgtg 240
 ctggaggaaa agaccaacgc cgccaagggc gtggccacca ataccagccg cgacggctcg 300
 gccacgctgg gcgtggcggc cgcccgcgcg ttcattggacg gcatcatcaa cgacaagctg 360
 gataccgata tctcgggccc caataccgcc aacggcaccg gcaagagcag cgccaacaac 420
 accttcaccg gcaccatcac gaccaccgtg atcgggggtgc tgcccaacgg caatctgcag 480
 atcgccggcg agaagcagat cgccatcaac cgccggcagc agtacgtgcg cttctcgggc 540
 gtggtcgacc cgcgatcgat caccggcagc aatacgggtg cgtcgaccgc ggtggccgcg 600
 gcgcgcatcg aataccgcag caagggcgctc atggacgaag tccagaccat gggctggctg 660
 caacgctttt tctgatcgcc ttcgcggttc tga 693

<210> 86
 <211> 230
 <212> PRT
 <213> Bordetella pertussis

<400> 86
 Val Met Leu Lys Thr Val Leu Arg Leu Pro Val Cys Ala Ala Leu Leu
 1 5 10 15
 Ala Leu Ala Ala Gly Cys Ala Met Ile Pro Pro Glu Pro Val Val Ile
 20 25 30
 Cys Pro Leu Thr Ala Pro Pro Pro Ser Pro Pro Gln Pro Ser Ala Arg
 35 40 45
 Pro Asn Gly Ser Ile Tyr Gln Pro Ser Ala Tyr Gly Asn Tyr Pro Leu
 50 55 60
 Phe Glu Asp Arg Arg Pro Arg Asn Val Gly Asp Ile Val Thr Ile Val
 65 70 75 80
 Leu Glu Glu Lys Thr Asn Ala Ala Lys Gly Val Ala Thr Asn Thr Ser
 85 90 95
 Arg Asp Gly Ser Ala Thr Leu Gly Val Ala Ala Ala Pro Arg Phe Met
 100 105 110
 Asp Gly Ile Ile Asn Asp Lys Leu Asp Thr Asp Ile Ser Gly Gly Asn
 115 120 125
 Thr Ala Asn Gly Thr Gly Lys Ser Ser Ala Asn Asn Thr Phe Thr Gly
 130 135 140
 Thr Ile Thr Thr Thr Val Ile Gly Val Leu Pro Asn Gly Asn Leu Gln
 145 150 155 160
 Ile Ala Gly Glu Lys Gln Ile Ala Ile Asn Arg Gly Ser Glu Tyr Val
 165 170 175
 Arg Phe Ser Gly Val Val Asp Pro Arg Ser Ile Thr Gly Ser Asn Thr
 180 185 190
 Val Ser Ser Thr Arg Val Ala Asp Ala Arg Ile Glu Tyr Arg Ser Lys
 195 200 205
 Gly Val Met Asp Glu Val Gln Thr Met Gly Trp Leu Gln Arg Phe Phe

210
Leu Ile Ala Ser Pro Phe
225 230

220

<210> 87
<211> 681
<212> DNA
<213> Bordetella pertussis

<400> 87
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gaggagcagg tgcccggcgg cgcgcggctg atctaccgcg acgcccgcgt caagccgcgc 180
cagtacaccg ccatgtggct gtcgccggtc gagtactacc ccagcccgcg accgtcggcg 240
caggtgtcga tggaaacgct gaccgaactg cagaactacc tggaccagtc gctgcgccgc 300
aagatcggcc gcgagatccg cctgggtcaac ggccccggcc cgggcgtggc caaggcgcg 360
atcgcgatca cagcggtcgg cagcgaaagc gaggcgctgg cggcctacca gtacatcccc 420
gtggcgctgg ccgtcaccgg cgccagggcc gtgctggaag gcggccggcc gcagcaggcc 480
accatcgcgga tcgaaagcaa ggtcaccgac agccagacgg gccagctgct gtgggcgtcg 540
gtgcgcgggg gcaccggcga gcgcgtacgc gccatcgccc agggccaggc ctcggtgccg 600
gcctcggcgc tcaagccgct gatcgacgaa tggaccgata acgtcgcacg tgaaatacgc 660
aactacgtgc gcagcaaata a 681

<210> 88
<211> 226
<212> PRT
<213> Bordetella pertussis

<400> 88
Met Lys Ser Ser Leu Tyr Arg Ile Ala Ala Leu Ser Ala Ala Ala Leu
1 5 10 15
Leu Leu Ala Gly Cys Ala Asn Gln Arg Ala Pro Lys Glu Ser Gly Phe
20 25 30
Leu Gly Asp Tyr Ser Gln Leu Arg Glu Glu Gln Val Pro Gly Gly Ala
35 40 45
Arg Leu Ile Tyr Arg Asp Ala Leu Lys Pro Arg Gln Tyr Thr Ala
50 55 60
Met Trp Leu Ser Pro Val Glu Tyr Tyr Pro Ser Pro Gln Pro Ser Ala
65 70 75 80
Gln Val Ser Met Glu Thr Leu Thr Glu Leu Gln Asn Tyr Leu Asp Gln
85 90 95
Ser Leu Arg Arg Lys Ile Gly Arg Glu Ile Arg Leu Val Asn Gly Pro
100 105 110
Gly Pro Gly Val Ala Lys Ala Arg Ile Ala Ile Thr Ala Val Gly Ser
115 120 125
Glu Ser Glu Ala Leu Ala Ala Tyr Gln Tyr Ile Pro Val Ala Leu Ala
130 135 140
Val Thr Gly Ala Arg Ala Val Leu Glu Gly Gly Arg Pro Gln Gln Ala
145 150 155 160
Thr Ile Ala Ile Glu Ser Lys Val Thr Asp Ser Gln Thr Gly Gln Leu
165 170 175
Leu Trp Ala Ser Val Arg Gly Gly Thr Gly Glu Arg Val Arg Ala Ile
180 185 190
Ala Gln Gly Gln Ala Ser Val Pro Ala Ser Ala Leu Lys Pro Leu Ile
195 200 205
Asp Glu Trp Thr Asp Asn Val Ala Arg Glu Ile Arg Asn Tyr Val Arg
210 215 220
Ser Lys
225

<210> 89
 <211> 561
 <212> DNA
 <213> Bordetella pertussis

<400> 89
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 gcctgcagtt ccgtccctct cgacgacaag gcaggtcaag ctggaggctc cggccagggt 180
 tcggcctccg gccagatcct ggatcccttc aaccgcgaaa gcattctggc gcaacagcgc 240
 tcgggtgtact ttgacttcga cagctatacg gtgtcggaac agtatcgcg cctgggtcgaa 300
 acccacgccc gctacctggc ttcgaacaac cagcagcgca tcaagatcga aggcaatacc 360
 gacgaacgcg gcggcgccga gtacaacctc gcaactgggc aacgccgtgc cgacgctgtc 420
 cgctgcgatga tgacctgtct ggggtgtgtcg gacaaccaga tcgaaacat tagtttcggc 480
 aagggaaagc cgaaggcgac ggggttcgagc gaggtgtgatt tcgccgagaa ccgccgcgcc 540
 gatatcgttt atcagcgcta a 561

<210> 90
 <211> 186
 <212> PRT
 <213> Bordetella pertussis

<400> 90
 Val Asn Gln Arg Gly Ala Leu Leu Pro Val Asn Thr Cys Asp Ser Leu
 1 5 10 15
 Cys Lys Gly Thr Ile Met Lys Ser Arg Ile Ala Lys Ser Leu Thr Ile
 20 25 30
 Ala Ala Leu Ala Ala Thr Leu Ala Cys Ser Ser Val Pro Leu Asp
 35 40 45
 Asp Lys Ala Gly Gln Ala Gly Gly Ser Gly Gln Gly Ser Ala Ser Gly
 50 55 60
 Gln Ile Leu Asp Pro Phe Asn Pro Gln Ser Ile Leu Ala Gln Gln Arg
 65 70 75 80
 Ser Val Tyr Phe Asp Phe Asp Ser Tyr Thr Val Ser Glu Gln Tyr Arg
 85 90 95
 Gly Leu Val Glu Thr His Ala Arg Tyr Leu Ala Ser Asn Asn Gln Gln
 100 105 110
 Arg Ile Lys Ile Glu Gly Asn Thr Asp Glu Arg Gly Gly Ala Glu Tyr
 115 120 125
 Asn Leu Ala Leu Gly Gln Arg Arg Ala Asp Ala Val Arg Arg Met Met
 130 135 140
 Thr Leu Leu Gly Val Ser Asp Asn Gln Ile Glu Thr Ile Ser Phe Gly
 145 150 155 160
 Lys Glu Lys Pro Lys Ala Thr Gly Ser Ser Glu Ala Asp Phe Ala Glu
 165 170 175
 Asn Arg Arg Ala Asp Ile Val Tyr Gln Arg
 180 185

<210> 91
 <211> 555
 <212> DNA
 <213> Bordetella pertussis

<400> 91
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 gcagcctccg ccctgaccgc ctgctcgctc ggcaaatggg gattccccta caaggccggc 120
 gtccagcaag gcaactggat caccaaagag caggtcgccc tgctgcagca aggcattgtcg 180
 cgcgaaacagg tgcgcttcgc cctgggcagc cccacgctga ccagcgtgct gcacgccgat 240
 cgctgggatt acccctacta cttcaagccc ggctacggca aggcgcagga acgccagttc 300

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accgtgtggt tcgagaacga ccacctggta cgctggagcg gggatgaaca gcccgcctc 360
cagccgttcc agatcgagaa agtgaacgcc aaacaggaag aaaaagccga cgcccagggtg 420
gatacggccg agaagcgcca ggaaggcatc gacaaggctg aaaaagtccg gcccctatgtc 480
gatgtcacga cgccggacaa ccccaccctc gactaccggg gcgagccggg ccaaaccctc 540
gaaccgtca agtaa 555

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<210> 92
 <211> 184
 <212> PRT
 <213> Bordetella pertussis

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<400> 92
Val Ser Met Ile Ala Arg Ile Ser Leu Arg Pro Leu Lys Gly Leu Ala
 1           5           10          15
Val Ala Val Leu Ala Ala Ser Ala Leu Thr Ala Cys Ser Ser Gly Lys
 20          25          30
Trp Gly Phe Pro Tyr Lys Ala Gly Val Gln Gln Gly Asn Trp Ile Thr
 35          40          45
Lys Glu Gln Val Ala Leu Leu Gln Gln Gly Met Ser Arg Glu Gln Val
 50          55          60
Arg Phe Ala Leu Gly Ser Pro Thr Leu Thr Ser Val Leu His Ala Asp
 65          70          75          80
Arg Trp Asp Tyr Pro Tyr Tyr Phe Lys Pro Gly Tyr Gly Lys Ala Gln
 85          90          95
Glu Arg Gln Phe Thr Val Trp Phe Glu Asn Asp His Leu Val Arg Trp
100         105         110
Ser Gly Asp Glu Gln Pro Asp Leu Gln Pro Phe Gln Ile Glu Lys Val
115         120         125
Asn Ala Lys Gln Glu Glu Lys Ala Asp Ala Gln Val Asp Thr Ala Glu
130         135         140
Lys Arg Gln Glu Gly Ile Asp Lys Ala Glu Lys Val Arg Pro His Val
145         150         155         160
Asp Val Thr Thr Pro Asp Asn Pro Thr Leu Asp Tyr Pro Gly Glu Pro
165         170         175
Gly Gln Thr Phe Glu Pro Leu Lys
180

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<210> 93
 <211> 549
 <212> DNA
 <213> Bordetella pertussis

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<400> 93
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agcggttcca tggcgcaaga gccgccttac aagagcacga tactgggctt gcaggcgacc 120
atcctggacc tgaagggtt gccgtccgac accgacggcg gcatatcgga cctgagcgcc 180
caagtgggtg cgctggccgc gcgccatgaa ggcgtgtcgg tacggcaggg caaggatgcc 240
gtcaccatcg ccatgatggg cgacgtactc ttcgatttcg acaaggccga catactcgcc 300
gcggccgaac ccactctgcg ggacatcgcg gagctgatca aatcccccg caccggcatc 360
gtcgccattg aaggtcacac ggactccaag ggctcggatt cctataacaa gggcctgtca 420
ttgcgacggg cccaggccgt tgcgcagtgg ctgggcgctc acggggtgga tgcagcgaaa 480
ctgtcggtca ggggcctggg ggctgccagg cccgtacagc ccaaccagct agctgtgaag 540
attcaatag 549

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<210> 94
 <211> 182
 <212> PRT
 <213> Bordetella pertussis

<400> 94

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Met Ala Thr His Pro Val Gly Pro Thr Leu Leu Ala Ala Leu Thr Leu
 1          5          10          15
Leu Ala Ala Cys Ser Gly Ser Met Ala Gln Glu Pro Pro Tyr Lys Ser
 20          25          30
Thr Ile Leu Gly Leu Gln Ala Thr Ile Leu Asp Leu Lys Gly Leu Pro
 35          40          45
Ser Asp Thr Asp Gly Gly Ile Ser Asp Leu Ser Ala Gln Val Gly Ala
 50          55          60
Leu Ala Ala Arg His Glu Gly Val Ser Val Arg Gln Gly Lys Asp Ala
 65          70          75          80
Val Thr Ile Ala Met Met Gly Asp Val Leu Phe Asp Phe Asp Lys Ala
 85          90          95
Asp Ile Leu Ala Ala Ala Glu Pro Thr Leu Arg Asp Ile Ala Glu Leu
100          105          110
Ile Lys Ser Pro Ala Thr Gly Ile Val Ala Ile Glu Gly His Thr Asp
115          120          125
Ser Lys Gly Ser Asp Ser Tyr Asn Lys Gly Leu Ser Leu Arg Arg Ala
130          135          140

Gln Ala Val Ala Gln Trp Leu Gly Ala His Gly Val Asp Ala Ala Lys
145          150          155          160
Leu Ser Val Arg Gly Leu Gly Ala Ala Arg Pro Val Gln Pro Asn Gln
165          170          175
Leu Ala Val Lys Ile Gln
180

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<210> 95
 <211> 504
 <212> DNA
 <213> Bordetella pertussis

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<400> 95
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gcggcggttg cgggctcggt ggccgttctg gccggctgcg ccaatcccag cgcacgcagt 120
ggggtgtaca cgtaaggcca ggcgacgcgc gagcagatcg tgcgcaccgg cacggtcacc 180
ggcgtgcgtc cgattaccat ccagaacgac aagtccagcg gcgtcggctt ggtggccggt 240
ggcgcgctgg gcggggtagc gggcaatgcc gtcggcgggc gcaccggccg caccatcgcc 300
acgggtgggc gcgtcatcct cggcgcgctg gcgggcaacg ccatcgagaa ccgcgcgggc 360
aagtcctccg gctacgaaat cacggtgcgc ctggacaacg gcgaaacccg ggtcgtggcg 420
caggaagccg acgtgcccac cagcgtgggc cagcgcgctgc aggtcatcag cggcgcgggc 480
ccgacccgcg tgacaccgta ttga 504

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<210> 96
 <211> 167
 <212> PRT
 <213> Bordetella pertussis

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<400> 96
Met Asn Tyr Met His Ser Pro Ser Val Val Ala Gly Arg Ala Arg Arg
 1          5          10          15
Leu Leu Ala Val Ala Ala Val Ala Gly Ser Val Ala Val Leu Ala Gly
 20          25          30
Cys Ala Asn Pro Ser Ala Ser Ser Gly Val Tyr Thr Tyr Gly Gln Ala
 35          40          45
Gln Arg Glu Gln Ile Val Arg Thr Gly Thr Val Thr Gly Val Arg Pro
 50          55          60
Ile Thr Ile Gln Asn Asp Lys Ser Ser Gly Val Gly Leu Val Ala Gly
 65          70          75          80
Gly Ala Leu Gly Gly Val Ala Gly Asn Ala Val Gly Gly Gly Thr Gly
 85          90          95

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Arg	Thr	Ile	Ala	Thr	Val	Gly	Gly	Val	Ile	Leu	Gly	Ala	Leu	Ala	Gly	
			100					105					110			
Asn	Ala	Ile	Glu	Asn	Arg	Ala	Gly	Lys	Ser	Ser	Gly	Tyr	Glu	Ile	Thr	
		115					120					125				
Val	Arg	Leu	Asp	Asn	Gly	Glu	Thr	Arg	Val	Val	Ala	Gln	Glu	Ala	Asp	
	130					135					140					
Val	Pro	Ile	Ser	Val	Gly	Gln	Arg	Val	Gln	Val	Ile	Ser	Gly	Ala	Gly	
145					150				155						160	
Pro	Thr	Arg	Val	Thr	Pro	Tyr										
				165												

<210> 97
 <211> 459
 <212> DNA
 <213> Bordetella pertussis

<400> 97
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 gccgccctgc tgcgggctg caacgcgaac gccccctcgg atacgccga gggcgcgccg 120
 ccgcccata cgcataacct gcgcaattcg ctggactggc aaggcacgta ccagggcggtg 180
 ctgccgtgcg ccgactgccc cggcatccgc acggtgctga ccctgcgcgc cgacaacacc 240
 taccagttgc agaccagta cctggagcgc cagccccgcc cggacacggt gcaaggcaga 300
 ttcggctggc tgacgggcca caacgccatc gagctcgaca gcgccggcga tcaactaccgt 360
 taccaggtcg gcgaaaaccg gctgaccatg atgtcgcaag acggcaccct gccacggcg 420
 ccgttggccg agcactacgt gctcaagcgc agccagtga 459

<210> 98
 <211> 152
 <212> PRT
 <213> Bordetella pertussis

<400> 98
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 1 5 10 15
 Val Leu Ala Leu Ala Ala Leu Leu Ser Ala Cys Asn Ala Asn Ala Pro
 20 25 30
 Ser Asp Thr Pro Glu Gly Ala Pro Pro Pro Asp Thr His Thr Ser Arg
 35 40 45
 Asn Ser Leu Asp Trp Gln Gly Thr Tyr Gln Gly Val Leu Pro Cys Ala
 50 55 60
 Asp Cys Pro Gly Ile Arg Thr Val Leu Thr Leu Arg Ala Asp Asn Thr
 65 70 75 80
 Tyr Gln Leu Gln Thr Gln Tyr Leu Glu Arg Gln Pro Arg Pro Asp Thr
 85 90 95
 Val Gln Gly Arg Phe Gly Trp Leu Thr Gly Asp Asn Ala Ile Glu Leu
 100 105 110
 Asp Ser Ala Gly Asp His Tyr Arg Tyr Gln Val Gly Glu Asn Arg Leu
 115 120 125
 Thr Met Met Ser Gln Asp Gly Thr Leu Pro Ser Gly Pro Leu Ala Glu
 130 135 140
 His Tyr Val Leu Lys Arg Ser Gln
 145 150

<210> 99
 <211> 5310
 <212> DNA
 <213> Bordetella pertussis

<400> 99

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tgcaccacct	cggggtccaa	caccacttgc	accgcagccg	gcggagcgca	tcgcgccaag	180
gtagggggcg	gctctaccgg	gaacaaccaa	cacgtcacgg	tgcaggccgg	tgcgcggatc	240
gaggccggcg	acagcggggc	catcagcgtg	ggcaataaca	gccgagtcca	gatccaggac	300
ggcgccgctg	tgcaaagcac	ggtcaatact	gctgcgtccg	gccagtacgc	caaaacgctg	360
gaagcagcaa	gcaataacaa	tatttccatc	caagtagggc	cgcagctcct	ggccaagggc	420
agcgcttcgc	agtccagcgc	gttgggattg	tcaggcgccg	gcaataccgt	caccaacct	480
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gccaatacca	tcgataacta	cgggactatc	gaaacagtgc	tcaatggcgg	ctacgccaac	600
gccatcggga	gcacgcggaa	caacagcgcc	acgggcgctg	gcgtgacggg	acgcaatcat	660
gccaacgggc	gcatcgctcg	caacgtgaag	ttcgaggctg	gcgacgacag	cgtcatactc	720
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gcgggcaagc	tgaccaaggc	cggctccggg	atgctgggtg	tcagcgccga	caaccgcat	3540
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accggcgcgg acaccgtcac gttcgcgggc gcgcatggcg tacgcgccag ccgccagaac 5160
acggccgtgg atctgaaggc gggcggtggac acgcagctgg gcaagagcgt aggcctgtgg 5220
gggcaggtag gctacggcaa gtcggtcggc agcggcgacg gcagcgaccg tggctggagc 5280
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<210> 100
 <211> 1769
 <212> PRT
 <213> Bordetella pertussis

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<400> 100
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35 40 45
Thr Cys Thr Ala Ala Gly Gly Ala His Arg Ala Lys Val Gly Gly Gly
50 55 60
Ser Thr Gly Asn Asn Gln His Val Thr Val Gln Ala Gly Ala Arg Ile
65 70 75 80
Glu Ala Gly Asp Ser Gly Ala Ile Ser Val Gly Asn Asn Ser Arg Val
85 90 95
Gln Ile Gln Asp Gly Ala Val Val Gln Ser Thr Val Asn Thr Ala Ala
100 105 110
Ser Gly Gln Tyr Ala Lys Thr Leu Glu Ala Ala Ser Asn Asn Ile
115 120 125
Ser Ile Gln Val Gly Ala Gln Leu Leu Ala Lys Gly Ser Ala Ser Gln
130 135 140
Ser Ser Ala Leu Gly Leu Ser Gly Ala Gly Asn Thr Val Thr Asn His
145 150 155 160
Gly Thr Ile Arg Ala Asp Asn Ala Ala Ala Ile Trp Ile Thr Ala Asn
165 170 175
Thr Ala Asn Ala Ala Asn Thr Ile Asp Asn Tyr Gly Thr Ile Glu Thr

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			180					185					190			
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Ser	Ala	Thr	Gly	Ala	Gly	Val	Thr	Val	Arg	Asn	His	Ala	Asn	Gly	Arg	
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Ile	Val	Gly	Asn	Val	Lys	Phe	Glu	Ala	Gly	Asp	Asp	Ser	Val	Ile	Leu	
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Asp	Gly	Gly	Ser	Thr	Ile	Thr	Gly	Ser	Leu	Asn	Gly	Gly	Ser	Gly	Asn	
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Asn	Ser	Leu	Thr	Leu	Lys	Ala	Gly	Asp	Gly	Thr	Leu	Gly	Arg	Ala	Ile	
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Arg	Asn	Phe	Gly	Thr	Ile	Thr	Lys	Gln	Glu	Ala	Gly	Thr	Trp	Thr	Leu	
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Asn	Gly	Gln	Val	Gly	Arg	Asn	Asp	Asn	Asn	Phe	Lys	Ser	Thr	Val	Lys	
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Gln	Gly	Gly	Val	Leu	Gln	Val	Ser	Ala	Gly	Ala	Thr	Ala	Asp	Val	Thr	
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Ala	Ala	Ser	Ala	Met	Gln	Ser	Ile	Ser	Asn	Ala	Gly	Thr	Val	Gln	Phe	
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Thr	Gln	Asp	Ser	Asn	Ala	Ala	Tyr	Ala	Gly	Val	Leu	Ser	Gly	Thr	Gly	
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Ser	Ile	Val	Lys	Arg	Gly	Gly	Gly	Asp	Leu	Thr	Leu	Thr	Gly	Asn	Asn	
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Thr	His	Thr	Gly	Lys	Val	Val	Glu	Ala	Gly	Ser	Leu	Ser	Val	Ser	Ser	
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Ala	Ala	Asn	Asn	Leu	Gly	Gly	Ala	Gly	Ser	Ser	Val	Gln	Leu	Lys	Gly	
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Gly	Ala	Leu	Ala	Leu	Lys	Lys	Thr	Ile	Ala	Val	Asn	Arg	Gly	Leu	Thr	
			420				425					430				
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	435					440					445					
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Glu	Ile	Asn	Asn	Gly	Thr	Leu	Arg	Ala	Ala	His	Asp	Ala	Ser	Leu	Gly	
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Phe	Thr	Ala	Thr	Arg	Ala	Leu	Thr	Leu	Ala	Gly	Asn	Glu	Ser	Ile	Asp	

Ala Ile Thr Leu Gln Gly Gly Asp Leu Leu Ala Gly Gly Ser Phe Ser
675 680 685
Ser Asn Arg Asp Leu Thr Leu Val Arg Gly Ser Leu Asp Val Ala Arg
690 695 700
Asp Ala Thr Leu Thr Trp Asn Gly Ala Ile Ser Gly Ala Gly Asp Leu
705 710 715 720
Val Lys Thr Gly Asp Gly Thr Leu Ala Leu Thr Gly Val Asn Glu Tyr
725 730 735
Ala Gly Gln Thr Val Leu Arg Gln Gly Lys Leu Arg Val Ala Arg Glu
740 745 750
Glu Ser Leu Gly Gly Ala Ala Leu Val Leu Glu Asn Asn Thr Val Phe
755 760 765
Glu Ser Ala Gly Ser Tyr Ala Ile Gly Arg Arg Val Thr Leu Lys Gly
770 775 780
Ala Pro Lys Val Ala Thr Pro Ala Gly Asp Thr Leu Glu Trp Arg Gly
785 790 795 800
Thr Val Asp Gly Asp Gly Lys Leu Tyr Lys Gln Gly Gly Gly Thr Leu
805 810 815
Val Leu Ser Gly Asn Asn Thr Tyr Ala Lys Gly Val Glu Val Trp Gly
820 825 830
Gly Val Val Gln Val Ser Arg Asp Gln Asn Leu Gly Ala Ala Asn Gly
835 840 845
Ala Val Thr Leu Asn Gly Gly Gly Leu Ala Ala Asn Gly Asp Phe Thr
850 855 860
Ser Asn Arg Gln Leu Glu Leu Thr Ala Gly Ala Lys Ala Ile Asp Val
865 870 875 880
Ala Ala Gly Lys Asp Val Thr Trp Arg Gly Val Val Asn Gly Ala Gly
885 890 895
Ala Leu Thr Lys Ala Gly Asp Gly Thr Leu Arg Leu Glu Ser Val Asn
900 905 910
Thr Tyr Thr Gly Gly Thr Arg Leu Gln Gly Gly Thr Val Gln Val Ser
915 920 925
Arg Asp Asn Asn Leu Gly Gln Ala Ala Gly Ala Val Thr Phe Asp Gly
930 935 940
Gly Arg Leu Ala Ser Thr Gly Ser Phe Ala Thr Ala Arg Ala Ala Thr
945 950 955 960
Leu Asn Asn Ala Gly Gln Ile Asp Thr Ala Gln Gly Thr Thr Leu Thr
965 970 975
Trp Asn Gly Ala Ile Gly Gly Lys Gly Glu Leu Arg Lys Gln Gly Ala
980 985 990
Gly Thr Leu Val Leu Gly Gly Ala Asn Thr Tyr Gln Gly Asp Thr Arg
995 1000 1005
Val Glu Ala Gly Thr Leu Gln Val Ser Ala Asp Ala Asn Leu Gly Gln
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1025 1030 1035 1040
Ala Thr Ser Arg Arg Leu Glu Leu Thr Gly Arg Gly Thr Val Gln Ala
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Ala Ala Ala Ala Thr Leu Asp Trp Arg Gly Thr Val Ala Gly Ala Gly
1060 1065 1070
Thr Leu Val Lys Glu Gly Ala Gly Thr Leu Val Leu Ala Gly Asp Asn
1075 1080 1085
Gln His Ala Gly Gly Thr Leu Val His Gly Gly Thr Leu Arg Ile Ala
1090 1095 1100
Arg Asp Ala Asn Leu Gly Ala Ala Gly Thr Ala Val Thr Leu Asp Gly
1105 1110 1115 1120
Gly Thr Leu Ala Thr Thr Ala Ser Leu Ala Leu Asp Arg Ala Leu Arg
1125 1130 1135
Val Gly Ala Arg Asn Gly Val Leu Leu Pro Asp Ala Gly Thr Thr Leu
1140 1145 1150
Asp Trp Arg Gly Val Val Ala Gly Ala Gly Lys Leu Thr Lys Ala Gly

1155	1160	1165
Pro Gly Met Leu Val Leu Ser Ala Asp Asn Arg His Gly Gly Gly Thr		
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Ala Val Thr Gly Gly Thr Leu Gln Val Ser Arg Asp Ala Asn Leu Gly		
1185	1190	1195
Ala Ala Ala Gly Ala Leu Thr Leu Asp Gly Gly Thr Leu Leu Ser Thr		1200
1205	1210	1215
Ala Ser Phe Ala Ser Ala Arg Ala Ala Thr Leu Asp Ala Ala Gly Gly		
1220	1225	1230
Thr Phe Val Thr Arg Asp Gly Thr Arg Leu Asp Trp Asp Gly Ala Ile		
1235	1240	1245
Gly Gly Ala Gly Gly Leu Val Lys Glu Gly Ala Gly Glu Leu Arg Leu		
1250	1255	1260
Gly Asn Ala Asn Thr Tyr Gln Gly Pro Thr Arg Ile Ala Ala Gly Arg		
1265	1270	1275
Leu Ala Val Asn Gly Ser Ile Ala Ser Pro Val Thr Val Glu Gln Ala		1280
1285	1290	1295
Gly Val Leu Gly Gly Thr Gly Arg Ile Val Gly Asp Val Ala Asn Arg		
1300	1305	1310
Gly Val Val Ala Pro Gly Asn Ser Ile Gly Ala Leu Thr Val Ala Gly		
1315	1320	1325
Asn Tyr Ala Gly Thr Gly Gly Ser Leu Glu Val Glu Ala Val Leu Gly		
1330	1335	1340
Gly Asp Ala Ala Pro Ala Asp Arg Leu Val Leu Asp Gly Gly Ala Ala		
1345	1350	1355
Ser Gly Val Thr Pro Val Val Val Lys Pro Gln Gly Gly Val Gly Gly		1360
1365	1370	1375
Leu Thr Leu Arg Gly Ile Pro Val Val Val Ala Gln Gly Gly Ala Thr		
1380	1385	1390
Thr Ala Pro Gly Ala Phe Arg Leu Ala Gln Pro Leu Val Ala Gly Ala		
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Tyr Glu Tyr Gln Leu Leu Arg Gly Ala Gly Asp Gly Ala Ala Ala Gln		
1410	1415	1420
Ala Gln Asp Trp Tyr Leu Arg Thr Ser Arg Val Glu Arg Asp Lys Ala		
1425	1430	1435
Gly Arg Ile Val Lys Val Val Pro Phe Tyr Arg Pro Glu Val Ala Leu		1440
1445	1450	1455
Tyr Ala Gly Thr Pro Met Leu Met Arg Met Thr Gly Thr Glu Met Leu		
1460	1465	1470
Gly Ser Tyr Arg Glu Arg Ala Gly Gln Thr Gly Ala Val Ser Pro Glu		
1475	1480	1485
Ala Gly Ala Thr Ala Ala Arg Gly Gly Trp Ala Arg Thr Phe Gly Arg		
1490	1495	1500
Arg Phe Glu Arg Ser Ala Gly Gly Glu Ala Ala Pro Ser Phe Asp Gly		
1505	1510	1515
His Leu Ala Gly Ala Gln Leu Gly Ala Asp Leu Tyr Ala Arg Ser Ser		1520
1525	1530	1535
Gly Thr Arg His Thr Asp Ala Phe Gly Val Phe Gly Gly Tyr Ala Thr		
1540	1545	1550
Val Arg Gly Asp Val His Gly Leu Ala Arg Gly Glu Ile Gln Ala Val		
1555	1560	1565
Gly Thr Ser Thr Leu Arg Ala Thr Gln Leu Gly Ala Tyr Trp Thr His		
1570	1575	1580
Thr Gly Pro Gly Gly Trp Tyr Ile Asp Thr Val Leu Ala Gly Thr Arg		
1585	1590	1595
Tyr Arg Gln Gln Thr Lys Ser Ser Ala Gln Val Gly Ala Val Ser Arg		1600
1605	1610	1615
Gly Trp Gly Met Thr Ala Ser Val Glu Ala Gly Tyr Pro Trp Gln Leu		
1620	1625	1630
Asn Pro Arg Trp Arg Ile Glu Pro Gln Ala Gln Val Val Tyr Gln Gln		
1635	1640	1645

Leu Gly Ile Ala Asn Gly Ala Asp Arg Val Ser Thr Val Ser Tyr Lys
 1650 1655 1660
 Thr Pro Asp Ala Leu Thr Ala Arg Leu Gly Thr Arg Leu Ser Gly Gln
 1665 1670 1675 1680
 Tyr Ala Tyr Gly Lys Ala Gln Leu Arg Pro Phe Met Gly Val Ser Leu
 1685 1690 1695
 Leu His Asp Phe Thr Gly Ala Asp Thr Val Thr Phe Ala Gly Ala His
 1700 1705 1710
 Gly Val Arg Ala Ser Arg Gln Asn Thr Ala Val Asp Leu Lys Ala Gly
 1715 1720 1725
 Val Asp Thr Gln Leu Gly Lys Ser Val Gly Leu Trp Gly Gln Val Gly
 1730 1735 1740
 Tyr Gly Lys Ser Val Gly Ser Gly Asp Gly Ser Asp Arg Gly Trp Ser
 1745 1750 1755 1760
 Ala Asn Leu Gly Leu Arg Val Ala Tyr
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<210> 101
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 <212> DNA
 <213> Bordetella pertussis

<400> 101
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 ggcaccaatg aactgtgtcg gcgcgatgcyg ttctggaccc cggctaccgg catccccggt 180
 tgcgacggcg ttccgggtcg tcagaaggaa aagtcgctc ccatggccgc caaggtcgtg 240
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 ggccacacgg actcgatcgg caccgaagcc tacaaccaga agctgtccga gcgccgtgcc 420
 gctgcggtca agacctacct ggctcagcaag ggtatcgacc ccaaccgtat ctacacggaa 480
 ggcaagggcg aactgcaacc gatcgcttcg aacaagacgc gtgaaggccg tgcccagaac 540
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 <211> 193
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 <213> Bordetella pertussis

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 Thr Ala Ser Gly Ala Ala Ser Ala Gln Thr Val Asp Asn Trp Arg Asn
 20 25 30
 Pro Phe Gly Asp Val Trp Lys Asn Gly Thr Asn Glu Leu Cys Trp Arg
 35 40 45
 Asp Ala Phe Trp Thr Pro Ala Thr Gly Ile Pro Gly Cys Asp Gly Val
 50 55 60
 Pro Val Ala Gln Lys Glu Lys Ser Ala Pro Met Ala Ala Lys Val Val
 65 70 75 80
 Phe Asn Ala Asp Thr Phe Phe Asp Phe Asp Lys Ser Thr Leu Lys Pro
 85 90 95
 Glu Gly Arg Gln Leu Leu Asp Gln Val Ala Gln Gln Ala Gly Thr Ile
 100 105 110
 Asp Leu Glu Thr Ile Ile Ala Val Gly His Thr Asp Ser Ile Gly Thr
 115 120 125
 Glu Ala Tyr Asn Gln Lys Leu Ser Glu Arg Arg Ala Ala Ala Val Lys
 130 135 140
 Thr Tyr Leu Val Ser Lys Gly Ile Asp Pro Asn Arg Ile Tyr Thr Glu
 145 150 155 160

Gly Lys Gly Glu Leu Gln Pro Ile Ala Ser Asn Lys Thr Arg Glu Gly
165 170 175
Arg Ala Gln Asn Arg Arg Val Glu Ile Glu Ile Val Gly Ser Arg Lys
180 185 190
Asn

<210> 103
<211> 582
<212> DNA
<213> Bordetella pertussis

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ggcaccaatg aactgtgctg gcgcgatgcg ttctggaccc cggctaccgg catccccggt 180
tgcgacggcg ttccggtcgc tcagaaggaa aagcccgtc ccatggccgc caaggtcgtg 240
ttcaatgctg acaccttctt cgacttcgac aagtcgacgc tgaagccgga aggccgccag 300
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ggccacacgg actcgatcgg caccgaagcc tacaaccaga agctgtccga gcgcctgccc 420
gctgcggtca agacctacct ggctcagcaag ggtatcgacc ccaaccgtat ctacacggaa 480
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<210> 104
<211> 193
<212> PRT
<213> Bordetella pertussis

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20 25 30
Pro Phe Gly Asp Val Trp Lys Asn Gly Thr Asn Glu Leu Cys Trp Arg
35 40 45
Asp Ala Phe Trp Thr Pro Ala Thr Gly Ile Pro Gly Cys Asp Gly Val
50 55 60
Pro Val Ala Gln Lys Glu Lys Pro Ala Pro Met Ala Ala Lys Val Val
65 70 75 80
Phe Asn Ala Asp Thr Phe Phe Asp Phe Asp Lys Ser Thr Leu Lys Pro
85 90 95
Glu Gly Arg Gln Leu Leu Asp Gln Val Ala Gln Gln Ala Gly Thr Ile
100 105 110
Asp Leu Glu Thr Ile Ile Ala Val Gly His Thr Asp Ser Ile Gly Thr
115 120 125
Glu Ala Tyr Asn Gln Lys Leu Ser Glu Arg Arg Ala Ala Ala Val Lys
130 135 140
Thr Tyr Leu Val Ser Lys Gly Ile Asp Pro Asn Arg Ile Tyr Thr Glu
145 150 155 160
Gly Lys Gly Glu Leu Gln Pro Ile Ala Ser Asn Lys Thr Arg Glu Gly
165 170 175
Arg Ala Gln Asn Arg Arg Val Glu Ile Glu Ile Val Gly Ser Arg Lys
180 185 190
Asn

<210> 105
<211> 2232

<212> DNA

<213> Bordetella pertussis

<400> 105

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<210> 106

<211> 743

<212> PRT

<213> Bordetella pertussis

<400> 106

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 20             25             30
Thr Ala Val Gln Leu Pro Ser Val Thr Val Glu Gly Glu Tyr Ser Ser
 35             40             45
Tyr Gln Pro Glu Ser Ala Gln Ser Pro Lys Phe Thr Ala Pro Leu Ala
 50             55             60
Asp Thr Pro Arg Thr Val Gln Val Ile Pro Glu Arg Leu Ile Gln Asp
 65             70             75             80
Gln Gly Ala Ser Asp Leu Glu Ala Val Leu Arg Asn Ala Pro Gly Ile
 85             90             95
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Ser	Met	Thr	Ala	Gly	Glu	Gly	Gly	Arg	Pro	Ala	Ser	Asp	Leu	Pro	Phe	100	105	110
Ile	Arg	Gly	Gln	Asn	Ser	Ala	Ser	Ser	Leu	Phe	Val	Asp	Gly	Leu	Arg	115	120	125
Asp	Pro	Ser	Thr	Gln	Ser	Arg	Asp	Thr	Phe	Asn	Leu	Glu	Gln	Val	Asp	130	135	140
Val	Val	Lys	Gly	Pro	Asp	Ser	Val	Phe	Ser	Gly	Arg	Gly	Gly	Ala	Gly	145	150	155
Gly	Ser	Ile	Asn	Leu	Val	Thr	Lys	Thr	Pro	Arg	Asn	Gln	Asp	Phe	Thr	165	170	175
Glu	Val	Gln	Ala	Gly	Ile	Gly	Thr	Ala	Glu	Thr	Tyr	Arg	Gly	Thr	Ile	180	185	190
Asp	Gly	Asn	Trp	Val	Leu	Gly	Glu	Asn	Thr	Ala	Leu	Arg	Leu	Asn	Leu	195	200	205
Leu	Gly	Thr	Arg	Gly	Thr	Val	Pro	Gly	Arg	Asp	Lys	Ala	Val	Glu	Phe	210	215	220
Ser	Arg	Val	Gly	Ile	Ala	Pro	Ser	Leu	Arg	Leu	Gly	Leu	Ser	Gly	Pro	225	230	235
Thr	Arg	Val	Thr	Leu	Gly	Leu	Tyr	Leu	Tyr	Arg	His	Arg	Arg	Val	Pro	245	250	255
Asp	Tyr	Ser	Ile	Pro	Tyr	Asp	Pro	Arg	Thr	Gly	Thr	Pro	Ile	Thr	Glu	260	265	270
Thr	Ile	Gly	Val	Ser	Arg	Arg	Asn	Phe	Tyr	Gly	Leu	Val	Gln	Arg	Asp	275	280	285
Ser	Gly	Asp	Thr	Glu	Asp	Tyr	Ala	Ala	Thr	Val	Lys	Trp	Glu	His	Asp	290	295	300
Leu	Ala	Asn	Gly	Phe	Lys	Val	Glu	Asn	Leu	Ala	Arg	Tyr	Ser	Arg	Ala	305	310	315
Thr	Val	Glu	Gln	Ile	Thr	Thr	Ile	Pro	Glu	Leu	Lys	Thr	Ala	Asp	Leu	325	330	335
Ala	Lys	Gly	Leu	Val	Tyr	Arg	Asn	Leu	Arg	Ala	Ser	Tyr	Gln	Val	Asn	340	345	350
Asp	Ser	Phe	Ala	Asn	Arg	Thr	Asp	Leu	Arg	Gly	Thr	Phe	Asp	Thr	Gly	355	360	365
Gln	Trp	Arg	His	Thr	Phe	Asp	Leu	Gly	Gly	Glu	Phe	Ala	Thr	Ser	Arg	370	375	380
Arg	Ser	Arg	Asp	Arg	Tyr	Lys	Gln	Glu	Ile	Pro	Asp	Ala	Ala	Ser	Pro	385	390	395
Cys	Ser	Pro	Val	Thr	Gly	Gly	Asn	Asn	Pro	Ala	Leu	Cys	Ala	Ser	Leu	405	410	415
Arg	Asp	Pro	Asp	Pro	His	Val	Asp	Phe	Pro	Gly	Thr	Val	Arg	Arg	Asn	420	425	430
His	Asn	Pro	Ala	Arg	Tyr	His	Thr	Asp	Ile	Leu	Ser	Leu	Tyr	Gly	Phe	435	440	445
Asp	Thr	Ile	Ala	Phe	Asp	Glu	Gln	Trp	Gln	Leu	Asn	Leu	Gly	Leu	Arg	450	455	460
Trp	Asp	His	Tyr	Lys	Thr	Ser	Gly	Arg	Asn	Leu	Pro	Val	Arg	Gly	Ala	465	470	475
Lys	Pro	Pro	Val	Tyr	Glu	Ser	Ala	Ala	Arg	Thr	Asp	Asn	Leu	Phe	Asn	485	490	495
Tyr	Gln	Leu	Gly	Leu	Val	Tyr	Lys	Pro	Arg	Pro	Asp	Gly	Ser	Val	Tyr	500	505	510
Ala	Ser	Tyr	Gly	Thr	Ala	Ser	Thr	Pro	Ser	Ala	Val	Ser	Asp	Tyr	Ala	515	520	525
Pro	Ala	Asp	Asn	Ile	Ser	Gly	Thr	Ser	Gln	Gln	Phe	Lys	Pro	Glu	Arg	530	535	540
Ser	Glu	Val	Ile	Glu	Val	Gly	Thr	Lys	Trp	Gln	Val	Leu	Asp	Arg	Arg	545	550	555
Leu	Leu	Val	Thr	Gly	Ala	Met	Phe	Arg	Glu	Thr	Arg	Lys	Asn	Thr	Ser	565	570	575
Ile	Glu	Val	Ala	Glu	Gly	Leu	Arg	Ala	Pro	Ala	Gly	Lys	Ser	Arg	Val			

			580					585					590				
Thr	Gly	Met	Glu	Leu	Gly	Val	Ala	Gly	Ser	Leu	Thr	Pro	Arg	Trp	Asp		
		595					600					605					
Val	Tyr	Gly	Gly	Tyr	Ala	Leu	Leu	Asp	Ser	Lys	Leu	Val	Arg	Ala	Ser		
	610					615					620						
His	Asn	Ser	Gly	Ala	Gln	Gly	Gln	Pro	Leu	Pro	Ser	Ala	Pro	Arg	His		
625					630					635					640		
Ala	Phe	Ser	Ile	Trp	Ser	Thr	Tyr	Lys	Leu	Leu	Pro	Glu	Leu	Thr	Val		
			645						650					655			
Gly	Ala	Gly	Ala	Phe	Tyr	Arg	Ser	Lys	Val	Tyr	Gly	Asn	Ala	Asp	Ala		
		660						665					670				
Gly	His	Asn	Lys	Asp	Gly	Thr	Pro	Lys	Ala	Arg	Trp	Val	Pro	Ala	Tyr		
		675				680						685					
Trp	Arg	Phe	Asp	Ala	Met	Ala	Ala	Tyr	Gln	Leu	Asn	Lys	His	Leu	Thr		
	690				695						700						
Ala	Gln	Leu	Asn	Val	Tyr	Asn	Leu	Leu	Asp	Lys	Thr	Tyr	Tyr	Ala	Lys		
705				710					715						720		
Thr	Tyr	Arg	Ser	His	Tyr	Ala	Ala	Leu	Gly	Pro	Gly	Arg	Ser	Ala	Met		
			725					730						735			
Leu	Thr	Phe	Lys	Leu	Ser	Tyr											
		740															

<210> 107
 <211> 1158
 <212> DNA
 <213> Bordetella pertussis

<400> 107
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 ttcaagggtga aaggcgctaa cgccgacgac agcgacttca agtacaacca cagccgcttc 180
 ggcgatgatca acggcggtgca gaacgggttcg cgctgggggtc tgcgtgggtac ggaagatctg 240
 ggtgacggcc tgcaagctgt gttccaactg gaatcgggct tcaactcggg caacggtaac 300
 tcggcccaag acggcgcgct gttcgggtcgc caagccacca tcggtctgca aagcgaaagc 360
 tggggccgctc tggacttcgg tcgccaaacc aacatcgctt cgaagtactt cggctcgatc 420
 gatccggttcg gcgctggctt cggatcaagcc aacatcggca tgggcatgag cgcgatgaac 480
 accgttcgct acgacaacat ggtcatgtac cagacccgt cgtacagcgg cttccagttc 540
 ggtatcgggt actcgttcag cgcgaaacgac aaggatgctg acgccgtcaa ccgcgttggc 600
 ttcgccaccg ccgacaacgt tcgtgccatc acgaccggtc tgcgctacgt gaacggcccg 660
 ctgaacgtcg ctctgctgta cgaccagctg aacgcctcga acaaccaagc ccaaggcgaa 720
 gttgacgcga ccccgcgag ctacggcctc ggcggttcgt atgacttcga agtcgtgaag 780
 ctggctctgg cctacgctcg cacgaccgac ggctgggttcg gtggccaagg ctaccgggtc 840
 gccgtcacgc tgccctcggg cgacaagttc ggcggttcg gcgtgaacac cttcgctgac 900
 ggcttcaagg ccaactcgta catggtcggc ctgtcggccc ccatcggcgg ccgagcaac 960
 gtgttcgggt cgtggcagat ggttgacccc aagctgaccg gcggcgacga gaagatgaac 1020
 gtcttctcgc tgggctacac ctacgacctg tccaagcgca ccaacctgta cgctacgggt 1080
 tcgtacgcca agaacttcgc gttcctggaa gatgccaagt cgaccgctgt cggcgctcgg 1140
 atccgtcacc gcttctaa 1158

<210> 108
 <211> 385
 <212> PRT
 <213> Bordetella pertussis

<400> 108
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 20 25 30
 Gly Ile Gly Tyr Asn Asp Val Asp Phe Lys Val Lys Gly Ala Asn Ala

	35					40				45					
Asp	Asp	Ser	Asp	Phe	Lys	Tyr	Asn	His	Ser	Arg	Phe	Gly	Met	Ile	Asn
	50					55					60				
Gly	Val	Gln	Asn	Gly	Ser	Arg	Trp	Gly	Leu	Arg	Gly	Thr	Glu	Asp	Leu
65					70					75					80
Gly	Asp	Gly	Leu	Gln	Ala	Val	Phe	Gln	Leu	Glu	Ser	Gly	Phe	Asn	Ser
				85					90					95	
Gly	Asn	Gly	Asn	Ser	Ala	Gln	Asp	Gly	Arg	Leu	Phe	Gly	Arg	Gln	Ala
			100					105					110		
Thr	Ile	Gly	Leu	Gln	Ser	Glu	Ser	Trp	Gly	Arg	Leu	Asp	Phe	Gly	Arg
		115						120					125		
Gln	Thr	Asn	Ile	Ala	Ser	Lys	Tyr	Phe	Gly	Ser	Ile	Asp	Pro	Phe	Gly
		130				135					140				
Ala	Gly	Phe	Gly	Gln	Ala	Asn	Ile	Gly	Met	Gly	Met	Ser	Ala	Met	Asn
145					150					155					160
Thr	Val	Arg	Tyr	Asp	Asn	Met	Val	Met	Tyr	Gln	Thr	Pro	Ser	Tyr	Ser
				165					170					175	
Gly	Phe	Gln	Phe	Gly	Ile	Gly	Tyr	Ser	Phe	Ser	Ala	Asn	Asp	Lys	Asp
			180					185					190		
Ala	Asp	Ala	Val	Asn	Arg	Val	Gly	Phe	Ala	Thr	Ala	Asp	Asn	Val	Arg
		195					200					205			
Ala	Ile	Thr	Thr	Gly	Leu	Arg	Tyr	Val	Asn	Gly	Pro	Leu	Asn	Val	Ala
		210				215					220				
Leu	Ser	Tyr	Asp	Gln	Leu	Asn	Ala	Ser	Asn	Asn	Gln	Ala	Gln	Gly	Glu
225					230					235					240
Val	Asp	Ala	Thr	Pro	Arg	Ser	Tyr	Gly	Leu	Gly	Gly	Ser	Tyr	Asp	Phe
				245					250					255	
Glu	Val	Val	Lys	Leu	Ala	Leu	Ala	Tyr	Ala	Arg	Thr	Thr	Asp	Gly	Trp
			260					265					270		
Phe	Gly	Gly	Gln	Gly	Tyr	Pro	Val	Ala	Val	Thr	Leu	Pro	Ser	Gly	Asp
		275					280					285			
Lys	Phe	Gly	Gly	Phe	Gly	Val	Asn	Thr	Phe	Ala	Asp	Gly	Phe	Lys	Ala
		290				295					300				
Asn	Ser	Tyr	Met	Val	Gly	Leu	Ser	Ala	Pro	Ile	Gly	Gly	Ala	Ser	Asn
305					310					315					320
Val	Phe	Gly	Ser	Trp	Gln	Met	Val	Asp	Pro	Lys	Leu	Thr	Gly	Gly	Asp
				325					330					335	
Glu	Lys	Met	Asn	Val	Phe	Ser	Leu	Gly	Tyr	Thr	Tyr	Asp	Leu	Ser	Lys
			340					345					350		
Arg	Thr	Asn	Leu	Tyr	Ala	Tyr	Gly	Ser	Tyr	Ala	Lys	Asn	Phe	Ala	Phe
		355					360					365			
Leu	Glu	Asp	Ala	Lys	Ser	Thr	Ala	Val	Gly	Val	Gly	Ile	Arg	His	Arg
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Phe															
385															

<210> 109
 <211> 1167
 <212> DNA
 <213> Bordetella pertussis

<400> 109
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 ttcaagggtga aaggcgctaa cgccgacggc agcgacttca agtacaacca cagccgcttc 180
 ggcgatgatca acggcggtgca gaacgggttcg cgctgggggtc tgcgtgggtac ggaagatctg 240
 ggtgacggcc tgcaagctgt gttccaactg gaatcgggct tcagctcggc caacggtaac 300
 tcggcccaag acggtcgcct gttcggtcgt caagccacca tcggtctgca aagcgaaagc 360
 tggggccgctc tggacttcgg tcgccaacc aacatcgct cgaagtactt cggctcgatc 420

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gatccggttcg gcgctggcctt cgggtcaagcc aacatcggca tgggcatgag cgcgatgaac 480
accggttcgct acgacaacat ggtcatgtac cagaccccgt cgtacagcgg cttccagttc 540
gggtatcggtc actcgttcag cgcgaacgac aaggacgctg acgccgtcaa ccgcgttggc 600
ttcgccaccg ccgacaacgt tcgtgccatc acgaccggtc tgcgctacgt gaacggccccg 660
ctgaacgctc ctctgtcgtc cgaccagctg aacgcctcga acaaccaagc ccaagacgaa 720
gttgacgccca ccccgcgag ctacggcatc ggcgggttcgt atgacttcga agtcgtgaag 780
ctggctctgg cctacgctcg cagaccgac ggcgtggttcg gtggccaagg ctaccggtc 840
gctgtcacgc tgcctcggg cgacaagtcc ggcgggttcg gcgtgaacac cttcgctgac 900
ggcttcaagg ccaactccta cctgttgggc ctgtcggtc cgatcggcgg cgccagcaac 960
gtgttcgggt cgtggcagat ggttgacccc agcaacgaca agctgaccgg cggcgacgag 1020
aagatgaacg tcttctcgct gggctacacc tacgacctgt ccaagcgac caacctgtac 1080
gcctacggtt cgtacgcaa gaacttcgcg ttcttggaag atgccaagtc gaccgctgtc 1140
ggcgtcggta tccgtcaccg cttctaa 1167

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<210> 110

<211> 388

<212> PRT

<213> Bordetella pertussis

<400> 110

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Met Lys Lys Thr Leu Leu Ala Ala Ala Leu Leu Ala Gly Phe Ala Gly
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Ala Ala Gln Ala Glu Thr Ser Val Thr Leu Tyr Gly Ile Ile Asp Thr
 20          25          30
Gly Ile Gly Tyr Asn Asp Val Asp Phe Lys Val Lys Gly Ala Asn Ala
 35          40          45
Asp Gly Ser Asp Phe Lys Tyr Asn His Ser Arg Phe Gly Met Ile Asn
 50          55          60
Gly Val Gln Asn Gly Ser Arg Trp Gly Leu Arg Gly Thr Glu Asp Leu
 65          70          75          80
Gly Asp Gly Leu Gln Ala Val Phe Gln Leu Glu Ser Gly Phe Ser Ser
 85          90          95
Ala Asn Gly Asn Ser Ala Gln Asp Gly Arg Leu Phe Gly Arg Gln Ala
 100         105         110
Thr Ile Gly Leu Gln Ser Glu Ser Trp Gly Arg Leu Asp Phe Gly Arg
 115         120         125
Gln Thr Asn Ile Ala Ser Lys Tyr Phe Gly Ser Ile Asp Pro Phe Gly
 130         135         140
Ala Gly Phe Gly Gln Ala Asn Ile Gly Met Gly Met Ser Ala Met Asn
 145         150         155         160
Thr Val Arg Tyr Asp Asn Met Val Met Tyr Gln Thr Pro Ser Tyr Ser
 165         170         175
Gly Phe Gln Phe Gly Ile Gly Tyr Ser Phe Ser Ala Asn Asp Lys Asp
 180         185         190
Ala Asp Ala Val Asn Arg Val Gly Phe Ala Thr Ala Asp Asn Val Arg
 195         200         205
Ala Ile Thr Thr Gly Leu Arg Tyr Val Asn Gly Pro Leu Asn Val Ala
 210         215         220
Leu Ser Tyr Asp Gln Leu Asn Ala Ser Asn Asn Gln Ala Gln Asp Glu
 225         230         235         240
Val Asp Ala Thr Pro Arg Ser Tyr Gly Ile Gly Gly Ser Tyr Asp Phe
 245         250         255
Glu Val Val Lys Leu Ala Leu Ala Tyr Ala Arg Thr Thr Asp Gly Trp
 260         265         270
Phe Gly Gly Gln Gly Tyr Pro Val Ala Val Thr Leu Pro Ser Gly Asp
 275         280         285
Lys Phe Gly Gly Phe Gly Val Asn Thr Phe Ala Asp Gly Phe Lys Ala
 290         295         300
Asn Ser Tyr Leu Leu Gly Leu Ser Ala Pro Ile Gly Gly Ala Ser Asn
 305         310         315         320
Val Phe Gly Ser Trp Gln Met Val Asp Pro Ser Asn Asp Lys Leu Thr

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[illegible]